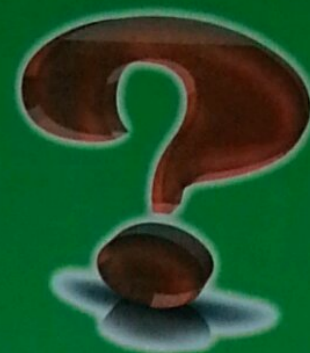


MCQ

Questions & Answers in



Internal Medicine



Internal Medicine Department
School of Medicine
Cairo University
2014

MCQ

Questions & Answers in Internal Medicine



**Internal Medicine Department
School of Medicine
Cairo University**

2014

الذي يرحون بالدموع يخصصون بالابتهاح
انظروا إلى الأجيال القديمة وتأملوا. هل توكّد أحد على الرب فخري؟
الذي بدأ معك أول الطريق له يترك في منتصفه
هو شافى هو عارف مش ينسى ☺

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PREFACE TO THE SECOND EDITION

Revising for medical exams can be extremely daunting, with endless hours of revision and practice questions never seeming to prepare medical students for the sorts of questions which were actually encountered when they took the exam.

With that in mind we sought to create a book which aimed to reflect the complexity of the questions that are devised by examiners while encouraging those using the book to read around the subject and gain a wider knowledge base and understanding of medicine in general.

The second edition draws on the strengths of the first and is revised to take into account comments and feedback from colleagues, students and, most importantly, those who have used the first edition of the book, taken their finals and passed, to create a better and more relevant guide for exam preparation.

We can't promise that this book has all of the questions that will be encountered in your final exams but hope that it does help you prepare for them, impart some knowledge along the way, and, most importantly, makes you feel more confident when you turn over the first page of the exam paper.

This book contains **434** Single Best Answer (SBA) MCQs, **405** Extended Matching Questions (EMQs), and **413** Direct Short Head MCQs. We hope it help you to pass your finals.

Dr. Hesham Tarraf M.D

Professor of Internal Medicine

Head of Internal Medicine Department

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PREFACE TO THE FIRST EDITION

Kasr AL Ainy hospital, founded in year 1837 by Dr. Antoine Colt, has evolved from a mere military hospital to a corner stone in medical education and practice. This evolution has a sole target: providing experts in the field of medical practice to ensure excellent medical service not only locally but also regionally and internationally.

In the spirit of this heritage, the internal medicine department is constantly seeking to improve and upgrade the methods of providing knowledge to its undergraduates, postgraduates as well as the young interns. Medicine is a science of development and novelty. But, the grasping and preserving of basic essential knowledge of medicine is the root to all successes and the path to brilliance in all fields of medical practice.

The internal medicine department, fully acknowledging its responsibility, has prepared a variety of sources from which its learner can acquire this knowledge. Consequently, the department is proud to present its book of Multiple Choice Questions.

The practice of evaluating learners using multiple choice questions is fairly new in our country. This method however has been adopted by a multitude of educational institutions worldwide owing to its complete lack of bias, its fairness and its global approach to the curriculum. With this purpose in mind, the department has introduced multiple choice questions in the end of year evaluation; with positive feedback from both students and faculty members.

I wish to emphasize that using this book as a tool of self-evaluation should not be its sole purpose. I urge all learners to incorporate it in their studies as a source of information and for revision. Learners of all ages have discovered that this is an enjoyable way to study.

I sincerely hope the book meets your expectations and gains merit. I want to thank the members of the faculty for their perseverance and competence, they made a great effort and for this, the department is grateful. I would like to wish all learners a good year and hope they find the book both useful and pleasurable.

Lastly, I dedicate this book to the martyrs of our revolution who sacrificed their lives to secure a new beginning for our beloved country.

Chief Editor
Professor, Esmat Sheba

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CARDIOLOGY

Multiple Choice Questions (MCQs)

1. A 67-year-old man presents with insomnia, irritability, and palpitations for 3 months. He is currently taking amiodarone for cardiac arrhythmias, fluoxetine for depression, and enalapril for hypertension. His blood pressure is 130/70 mm Hg, his pulse is 90/min and regular. **Which of the following is the most appropriate next step?**
 - A. Administration of propranolol
 - B. Measurements of thyroxine and TSH
 - C. Referral for psychiatric consultation
 - D. Substitution of antidepressant drug
 - E. Substitution of antihypertensive drug

The correct answer is B. Insomnia, irritability, and palpitations are nonspecific symptoms that may be caused by a variety of diseases and drugs, but they are frequent manifestations of hyperthyroidism. Furthermore, the fact that the patient takes amiodarone should prompt investigations for hyperthyroidism. Amiodarone causes symptomatic hyperthyroidism in a small percentage of patients (2 to 3%) and asymptomatic elevation of T3 and T4 with much greater frequency. Thus, thyroid hormone measurements should be combined with measurement of TSH, which is suppressed in the presence of significant thyroid hyper function.

2. A 55-year-old woman with long-standing diabetes mellitus and a 2-year history of progressive renal failure comes to medical attention because of chest pain for 12 hours. The pain is sub sternal and continuous, with radiation to the neck. She is on a strict dietary regimen with protein, fluid, and salt restriction. Her temperature is 37.2° C, blood pressure is 150/85 mm Hg, pulse is 82/min and regular, and RR is 16/min. There is no jugular vein distention or pitting edema. Auscultation reveals a rubbing sound in the precordial region and slightly distant but normal heart sounds. Lungs are clear to auscultation. A chest x-ray film shows a normal cardiac outline, and an ECG shows nonspecific ST changes. Echocardiogram reveals mild fluid collection within the pericardial sac. **Which of the following is the most appropriate next step in management?**
 - A. Antibiotic treatment
 - B. Antihypertensive treatment
 - C. Anti-inflammatory treatment
 - D. Erythropoietin administration
 - E. Hemodialysis

The correct answer is E. A friction rub on auscultation indicates that the patient's chest pain is due to acute fibrinous pericarditis. ECG changes in this condition are often nonspecific, but echocardiography is a sensitive diagnostic tool. Renal failure is one of the most common causes of acute pericarditis (*uremic pericarditis*), which usually occurs when BUN exceeds 100 mg/dl (often earlier in diabetic patients). Fever is usually

absent in uremic pericarditis. Institution of hemodialysis (or more aggressive hemodialysis) promptly leads to resolution of pericarditis. Indeed, the onset of acute pericarditis is an absolute indication to start hemodialysis treatment.

3. A 52-year-old man with a 30-pack-year history of cigarette smoking presents for follow up. He was told that he had "high cholesterol" about 2 years ago, and he has a history of mild hypertension for which he has never been treated. He had a myocardial infarction (MI) 6 months ago. His post-MI course has been uncomplicated, his exercise stress test was satisfactory, and he has experienced no subsequent chest pain. His medications include aspirin 150 mg/ day. Physical examination is normal except for a fourth heart sound. **Which of the following is the most appropriate next step in management to prevent significant morbidity and mortality?**

- A. Add a beta blocker
- B. Add enalapril
- C. Add nifedipine
- D. Increase the aspirin
- E. Prescribe nitroglycerin

The correct answer is A. Beta blockers have been shown to decrease the incidence of nonfatal reinfarction and recurrent ischemic events. They decrease both infarct size and mortality. Enalapril is recommended for the first 6 weeks in patients with a large anterior wall infarction to decrease mortality by preventing infarct remodeling and expansion, although angiotensin converting enzyme (ACE) inhibitors may be harmful if hypotension is present. Calcium-channel blockers, especially diltiazem and verapamil, may be beneficial if the ejection fraction is adequate. Nifedipine has been shown to increase mortality in patients following an MI.

The patient is already taking aspirin. Increasing the dose will not help and, in fact, may hurt him. Adding nitroglycerin would be appropriate if the patient developed angina, but at present he has none.

4. A 47-year-old woman presents with several episodes of severe chest pain that awoke her in the early morning. She has no history of major physical illness or drug abuse, and does not smoke. Her temperature is 37.0°C, blood pressure is 125/80 mm Hg, pulse is 78/min and regular, and RR is 12/min. An ECG reveals no abnormalities and the physician tells the patient that her pain is probably of psychological origin. After a few days, the patient comes to ER at 5 AM complaining of chest pain. An ECG reveals sinus rhythm with ST segment elevation. The patient is admitted, and coronary arteriography is performed, revealing no stenotic lesions. Intravenous administration of ergonovine during arteriography triggers chest pain accompanied by ST elevation on ECG. **Which of the following is the most likely diagnosis?**

- A. Myocardial Infarction
- B. Prinzmetal angina
- C. Psychological chest pain
- D. Stable angina
- E. Unstable angina

The correct answer is B. The clinical presentation is characteristic of Prinzmetal angina, a form of recurrent myocardial ischemia due to transient coronary vasospasm.

ST elevation on ECG during ischemic episodes is highly characteristic. This condition is most often seen in women younger than 50. Coronary angiography frequently fails to disclose any stenotic segments, but the ergonovine test (to be performed with great caution) triggers vasospasm and anginal pain. Myocardial infarction usually manifests with intense precordial pain that persists for more than 30 minutes associated with characteristic ECG changes. Psychological chest pain may manifest with variable clinical patterns and is usually associated with other symptoms, such as depression, anxiety, or panic attacks. ECG changes, such as ST elevation, are absent. Precordial pain due to stable angina by definition manifests with a predictable pattern, usually following constant amounts of physical exertion, emotional stress, or exposure to cold temperatures. Unstable angina usually follows a period of stable angina. The attacks of precordial pain become more frequent and less predictable, and tend to occur at rest. Increasing degrees of coronary artery stenosis and/or platelet thrombi are thought to be the underlying pathologic substrate.

5. A 62-year-old man presents with episodic sub sternal chest tightness, occurs after physical exertion, and is relieved promptly by rest. The patient has noted that the amount of activity sufficient to trigger the pain is relatively constant, such as climbing three flights of stairs or walking uphill for a few minutes. An ECG recorded at rest, however, fails to show any abnormalities. **Which of the following is the most appropriate next step in diagnosis?**

- A. Ambulatory ECG monitoring
- B. Coronary arteriography
- C. Echocardiography
- D. Exercise ECG
- E. Myocardial perfusion scintigraphy

The correct answer is D. The patient's symptomatology is consistent with angina pectoris. During ischemic attacks, ECG usually shows a flat or down-sloping ST depression. The resting ECG may be normal in up to 25% of patients with typical angina between the attacks. In patients without ECG abnormalities at rest, exercise ECG is the most useful and cost-effective test to document myocardial ischemia.

Ambulatory ECG monitoring is mainly used to document clinically silent (i.e., painless) episodes of myocardial ischemia, which may be more frequent than the clinically apparent ones in some patients. Coronary arteriography is the gold standard for the diagnosis of coronary artery disease since it documents site and severity of stenotic lesions. Generally, it is indicated when coronary artery revascularization is being considered; it is not a first diagnostic procedure. It has a mortality of 1/1000.

Echocardiography may reveal abnormalities in ventricular wall motion, which can be a result of current ischemia or prior myocardial infarction. It allows the study of left ventricular function, which is an important prognostic factor that influences treatment

strategies as well. Myocardial perfusion scintigraphy is performed by injection of radiotracers (thallium and technetium⁹⁹ are the most frequently used), which are taken up by viable myocardium. Scintigraphic defects indicate areas of ischemia. This is usually done after exercise ECG.

6. A 64-year-old man is brought to the ER because of sudden onset of tearing chest pain radiating to the back in the interscapular region. On examination, he is oriented to person, place, and time; however, he appears in acute distress, is diaphoretic, and is breathing with difficulty. His temperature is 37.1°C, blood pressure is 175/70 mm Hg, pulse is 106/min, and RR is 25/min. There is no jugular vein distention or hepatomegaly. Auscultation reveals a diastolic murmur along the left sternal border, the lungs are clear to auscultation. The ECG shows no signs of myocardial ischemia. A chest x-ray film demonstrates widening of the mediastinum. **Which of the following is the most likely diagnosis?**

- A. Acute mediastinitis
- B. Acute pericarditis
- C. Aortic dissection
- D. Cardiac tamponade
- E. Myocardial infarction

The correct answer is C. A tearing, excruciating chest pain that radiates to the back should always generate the clinical suspicion of aortic dissection involving the aortic arch. The patient presents with extreme signs of distress. Aortic insufficiency, with its associated diastolic murmur and widened pulse pressure, frequently develops. A discrepancy in blood pressure or pulse between the right and left arms is an additional supporting sign. Mediastinal widening is often seen on chest x-ray, but the diagnosis should be confirmed by CT or MRI scans. Hypertension is the most common predisposing factor, but Marfan's syndrome is a classic condition associated with aortic dissection.

7. A 56-year-old woman with a long history of untreated hypertension is brought to the ER because of severe headache and confusion. The patient is oriented to person, but not to time or place. Her blood pressure is 230/140 mm Hg, pulse is 86/min, and RR is 18/min. Funduscopic examination reveals optic disk edema, and a dipstick test shows protein in the urine. **Which of the following is the most appropriate pharmacotherapy?**

- A. Clonidine
- B. Esmolol
- C. Furosemide
- D. Hydralazine
- E. Sodium nitroprusside

The correct answer is E. The patient is exhibiting the clinical picture of *hypertensive emergency*, in which striking elevation of blood pressure (diastolic values often >130 mm Hg) is associated with signs and symptoms of both cerebral damage (headache, confusion, and optic disk edema) and renal damage (proteinuria). Aggressive management is required to avoid serious complications or death and is aimed at gradually lowering blood pressure within 1 hour. IV infusion of sodium nitroprusside is the treatment of choice, but its administration should be carefully titrated to obtain the desired effect without excessively rapid reduction in blood pressure. Clonidine is an oral antihypertensive agent that should be reserved for less severe cases of hypertension (so-called *hypertensive urgencies*), in which signs of cerebral or renal damage are not detectable. Esmolol is a beta blocker drug that has been useful in treating hypertensive emergencies in the presence of myocardial ischemia. However, it should be combined

with some other antihypertensive agent. Furosemide as well as other IV loop diuretics may be useful in the presence of signs of cardiac failure or fluid retention, but their action is slow to manifest. Hydralazine is mainly used in hypertensive crises affecting children and pregnant women. It may induce dangerous reflex tachycardia.

8. A 45-year-old woman presents for a Check-Up visit. She has no complaints but has a history of diabetes and a family history of hypertension. On physical examination, the patient's blood pressure is 150/100 mm Hg. Laboratory results were normal. **Which of the following agents would be most appropriate for the management of her hypertension?**

- A. Atenolol
- B. Captopril
- C. Furosemide
- D. Hydrochlorothiazide
- E. Isordil

The correct answer is B. This question tests your knowledge about the effectiveness of angiotensin converting enzyme (ACE) inhibitors in cardiac remodeling in diabetics. High-dose ACE inhibitors have been shown to have a mortality benefit in hypertensive patients. All the other medicines are good anti-hypertensive alternatives, but captopril is the most effective in diabetics. ACE inhibitors also exert a protective effect on the kidneys in diabetics by inhibiting the actions of angiotensin II on renal afferent arterioles and by attenuating the stimulatory effect of angiotensin II on glomerular cell growth and mesangial matrix production. Of course if the creatinine were high, indicating renal insufficiency, then we would have to re-evaluate our options. Atenolol would be the drug of choice in a patient with coronary artery disease. Beta blockers reduce mortality in such patients by decreasing chronotropy and exerting a protective effect.

Furosemide is a loop diuretic used in congestive heart failure. Hydrochlorothiazide is a diuretic useful in the management of hypertension, especially in African Americans. Isordil belongs to the nitrate family of vasodilators and exerts its effects as a vasodilator that decreases preload. It is used as an adjunct to first-line therapy in hypertension and coronary artery disease.

9. An otherwise healthy 28-year-old man presents with recent onset of chest pain. He started an active exercise program of weight lifting 1 week prior to the onset of symptoms. The pain began 24 hours ago and has been constant in intensity it is sharp, localized, and exacerbated by movement. His temperature is 37°C, blood pressure is 125/80 mm Hg, pulse is 70/min, and RR is 12/min. There is tenderness on palpation of the chest wall muscles in the precordial region. **Which of the following is the most appropriate next step in management?**

- A. Administration of antacid
- B. ECG at rest and during exercise
- C. Psychological screening tests
- D. NSAID & Stop future muscle overuse
- E. Performance of a Bernstein test

The correct answer is D. Most cases of chest pain occurring in young patients are of

non-cardiac origin. In particular, chest pain arising in patients aged 18-45 is usually due to one of three causes: muscular chest pain, costochondritis (Tietze syndrome), or gastro esophageal reflux. Factors supporting a diagnosis of chest pain of muscular origin, in this case, include exacerbation with movement, tenderness on palpation, and onset following strenuous physical exercise. When the clinical picture is clear, no further diagnostic tests are necessary (or cost-effective). The patient should receive symptomatic treatment, which may include administration of anti-inflammatory drugs, rest, and appropriate instructions to avoid future overuse of chest wall muscles.

10. A 46-year-old woman complains of dyspnea on exertion and orthopnea that started 7 months ago. She has a prior history of pericarditis, which had been treated with indomethacin. An ECG shows low voltage in the limb leads. A chest radiograph reveals pericardial calcification, and echocardiography shows pericardial thickening. Cardiac catheterization reveals equal pressures in the four cardiac chambers during diastole with all pressures elevated. Which of the following findings would help to diagnose her condition?

- A. Exaggerated S₁ and S₂
- B. Fourth heart sound (S₄)
- C. Third heart sound (S₃)
- D. Increased neck vein distention on inspiration
- E. Predominance of left-sided symptoms over right sided symptoms

The correct answer is D. Constrictive pericarditis is the diffuse thickening of the pericardium in reaction to prior inflammation, which results in reduced distensibility of the cardiac chambers. Cardiac output is limited, and filling pressures are increased to match the external constrictive force placed on the heart by the pericardium. In both constrictive pericarditis and cardiac tamponade, the diastolic pressures are equal in all four chambers of the heart. The jugular veins are distended, indicating systemic venous hypertension. This neck vein distention increases with inspiration and is called Kussmaul's sign.

11. A 69-year-old man with history of congestive heart failure secondary to hypertension and atrial fibrillation presents with increasing nausea, headache, and blurred vision in both eyes over the past 3 days. He also complains of seeing "yellow halos around lights." His medications include hydrochlorothiazide, enalapril, and digoxin. His blood pressure is 135/85 mm Hg, pulse is 56/min with irregular rhythm, and RR is 16/min. Which of the following is the most likely cause of these symptoms?

- A. Acute narrow-angle glaucoma
- B. Digoxin toxicity
- C. Diuretic-induced hypokalemia
- D. Enalapril overdose
- E. Malignant hypertension

The correct answer is B. The symptoms of a yellow-green cast to the vision are characteristic of digitalis toxicity. Bradycardia and different types of arrhythmias are also effects of excess digitalis. The medication should be immediately discontinued in these cases.

12. A 70-year-old woman with a history of diabetes mellitus, hypertension, chronic obstructive lung disease, and congestive heart failure is admitted to the hospital for a deep vein thrombosis of the right lower extremity. Heparin is started at the time of admission. Her outpatient medications include NPH insulin, furosemide, albuterol, and metoprolol. Admission laboratories show an elevated potassium level (6.0 mEq/L), which is confirmed on repeat testing. Which of the following medications should be discontinued?

- A. Albuterol
- B. Enalapril
- C. Furosemide
- D. Heparin
- E. NPH insulin

The correct answer is B. All angiotensin converting enzyme (ACE) inhibitors produce varying degrees of hyperkalemia because of their effect on reducing aldosterone release. Beta agonists, such as albuterol, loop diuretics, such as furosemide, heparin, and insulin all of them cause potassium shifts into cells, which decrease the serum levels of potassium. These medications can be continued because they are not worsening the hyperkalemia, and may in fact help to control the hyperkalemia.

13. A 54-year-old man presents to the ER complaining of epigastric discomfort, which began while he was exercising after dinner about one and half hour earlier. He has not received medical care for several years. On examination, he is moderately obese and in obvious discomfort and seems restless. His BP is 160/100 mmHg, and his examination is otherwise unremarkable. His ECG showed elevated S-T segment in leads II, III and AVF. Which of the following is the most likely diagnosis?

- A. Anterolateral myocardial infarction
- B. Costochondritis
- C. Gastro esophageal reflux
- D. Inferior wall myocardial infarction
- E. Pericarditis

The correct answer is D. This ECG reveals ST-segment elevation in II, III, and AVF, indicating acute injury of the inferior wall of the myocardium. Inferior wall ischemia can be perceived as pain in the epigastric area. Anterolateral myocardial infarction would show loss of R-wave progression in V4 through V6. Pericarditis would show diffuse ST segment elevation in limb and precordial leads. Although his symptoms could suggest gastro esophageal reflux, this ECG shows this a cardiac event. Costochondritis is not present by examination.

14. A 54-year-old man presents to the ER complaining of epigastric discomfort, which began while he was exercising after dinner about one-half hour earlier. He has not received medical care for several years. On examination, he is moderately obese and in obvious discomfort and seems restless. His BP is 160/100 mmHg, and his examination is otherwise unremarkable. His ECG showed elevated S-T segment in leads II, III and AVF. Which of the following is the most appropriate next step in management?

- A. Arrange for cardiac intensive care bed
- B. Arrange for urgent echocardiogram
- C. Begin thrombolytic therapy in the emergency department
- D. Reassurance and arrange outpatient follow-up
- E. Trial of antacid immediately

The correct answer is C. When ST segment elevation is present, a patient should be considered a candidate for reperfusion therapy or primary percutaneous intervention (PCI) such as angioplasty and stenting. If no contraindications are present and PCI is unavailable, thrombolytic therapy should ideally be initiated within 30 minutes, right in the emergency department. The goal of both thrombolysis and PCI is prompt restoration of coronary arterial patency. Thrombolytic therapy can reduce the risk of in-hospital death by up to 50% when administered within the first hour of symptoms, so time is of the essence. Arranging for a bed may waste time for limiting infarct size. The ECG would obviously preclude the other two options: immediate trial of antacid or reassurance and arranging outpatient follow-up.

15. A 23-year-old woman comes for a Check-Up visit. She enjoys good health and exercises regularly. Her height is 172 cm and weight is 66 kg. Her blood pressure is 120/80 mm Hg, pulse is 74/mm, and RR is 12/mm. Physical examination is unremarkable except for heart auscultation, which reveals an isolated midsystolic click. Which of the following is the most common cause of this auscultatory finding?

- A. Bicuspid aortic valve
- B. Congenital pulmonary stenosis
- C. Mitral valve prolapse
- D. Ruptured papillary muscle
- E. Tricuspid regurgitation

The correct answer is C. The most characteristic manifestation of a floppy mitral valve (myxomatous degeneration — mitral valve prolapse) is a mid-systolic click. This frequently asymptomatic condition may be associated with chest pain, dyspnea, palpitations, and other nonspecific symptoms. Patients with a mid-systolic click as the only sign are usually asymptomatic; however, those with a systolic murmur may have hemodynamically significant mitral valve regurgitation. In addition, mitral valve prolapse is associated with an increased incidence of infective endocarditis, arrhythmias, sudden death, and cerebral embolism.

Bicuspid aortic valve is the most frequent type of congenital defect of the aortic valve. It may manifest with valvular stenosis, giving rise to a systolic murmur sometimes associated with an opening click. Congenital pulmonary stenosis is a rare condition that gives auscultatory signs similar to aortic stenosis, i.e., a harsh systolic click sometimes associated with an opening click. A ruptured papillary muscle may develop as a complication of infective endocarditis or myocardial infarction. It may lead to mitral or

tricuspid regurgitation and thus manifest with a systolic murmur not associated with clicks. Tricuspid regurgitation manifests with a harsh systolic murmur that increases in intensity during inspiration. The most common cause is right ventricular overload; less common causes are infective endocarditis and right ventricular myocardial infarction.

16. A 65-year-old man with a history of peripheral vascular disease develops thromboembolic disease in his left leg accompanied by dry gangrene. Laboratory tests show elevated serum lactic acid, and his arterial pH is 7.27. An ECG in this patient is most likely to show which of the following?

- A. Peaked T waves
- B. QT prolongation
- C. ST depression
- D. T wave inversion
- E. U waves

The correct answer is A. Peaked T waves are associated with significant hyperkalemia that may lead to arrhythmia. In this patient, the primary mechanism of hyperkalemia is acidosis. Calcium gluconate should be administered to decrease membrane excitability. Hypocalcaemia causes prolonged QT intervals. The QT interval is the time difference between ventricular depolarization and repolarization. Since the QT interval depends on the heart rate, the corrected QT interval (QTc) is often used. The correction factor incorporates the interval between consecutive P waves. ST depression would be seen in an ischemic event. It is important to compare the new ECG with an old one to determine whether the depression is new. If this is the case, the patient with such ECG changes should at least be placed on aspirin and observed for an ischemic event. T wave inversion is another indication that the patient may be undergoing an ischemic event. Once again, it is important to compare the new ECG with an old one. Furthermore, if the new ECG shows upright T waves, but the old one shows inverted T waves, this denotes "pseudonormalization" and once again indicates an ischemic event. U waves are seen in hypokalemia. If an ECG shows these changes, the risk of an arrhythmia is significant, and the hypokalemia must be corrected immediately. This can usually be achieved by administering oral potassium, but occasionally IV potassium may be required.

17. An 18-year-old man is referred for evaluation of hypertension. On examination, he appears in no apparent discomfort and states that he has never had any health problems. His height is 175 cm, and his weight is 70 kg. There is no pitting edema in the lower legs or jugular vein distention. The lungs are clear to auscultation. Blood pressure is 160/80 mm Hg in the upper extremities and 115/75 mm Hg in the lower extremities. Femoral pulses are weaker than radial pulses. A systolic murmur is appreciated at the base of the heart and is particularly intense in the back. The ECG shows changes consistent with left ventricular hypertrophy, and a chest x-ray film reveals notching of the inferior margins of the ribs. Which of the following is the most likely diagnosis?

- A. Atrial septal defect (ASD)
- B. Coarctation of the aorta
- C. Congenital aortic stenosis
- D. Congenital pulmonary stenosis
- E. Patent ductus arteriosus

The correct answer is B. The specific signs that suggest the correct diagnosis include the wide discrepancy between the blood pressure in the upper extremities and lower extremities, the systolic murmur heard on the back, and the notching of the ribs appreciated on x-ray. Coarctation of the aorta, in its most frequent (adult) type, consists of a stenotic aortic segment just distal to the origin of the left subclavian artery. Hypertension develops in the branches proximal to the stenosis, and hypotension in the aorta distal to it. In the most severe forms, the patients may develop left ventricular failure in infancy, but the most common presenting picture is that of a young adult with hypertension, which may lead to left ventricular hypertrophy or cerebral hemorrhage.

Atrial septal defect (ASD) is generally asymptomatic. A large ASD usually leads to right ventricular failure in middle age. A systolic murmur is heard at the pulmonary area, and S2 is widely split. Congenital aortic stenosis gives rise to a harsh systolic murmur heard along the left sternal border and radiating to the neck. It is due to congenitally abnormal, usually bicuspid, aortic valves. Congenital pulmonary stenosis is a rare form of congenital valvular disease. Mild-to-moderate stenosis is usually asymptomatic, but severe cases result in right-sided heart failure or sudden death. A systolic murmur is heard at the second left intercostal space, often preceded by an ejection click. Adults with a small or medium-size patent ductus arteriosus are usually asymptomatic until middle age. This anomaly is associated with a characteristic continuous "machinery-like" murmur, which is maximal at the pulmonary area and often accompanied by a thrill.

18. A 55-year-old male smoker with diabetes and hypertension presents with complaints of chest pain on exertion. Exercise stress testing shows reversible ischemia in the anteroapical portion of the heart after exercising 4 minutes. Cardiac catheterization reveals an 80% stenosis of the left main coronary artery. **Which of the following is the most appropriate intervention?**

- A. Beta blocker
- B. Coronary artery bypass grafting
- C. Percutaneous balloon angioplasty
- D. Re-examination in 6 months
- E. Sublingual nitroglycerin as needed

The correct answer is B. This patient has exertional angina, an abnormal stress test, and occlusive atherosclerotic disease of the left main coronary artery. He is at high risk for adverse cardiac events, including myocardial infarction and death, and should receive treatment. The treatment of choice is coronary artery bypass grafting, which has been shown to decrease symptoms and mortality in patients with left main coronary artery disease.

The patient needs immediate treatment, so instructing the patient to return in 6 months is unwise. Beta blockers decrease the anginal symptoms and mortality from coronary artery disease, but are not a replacement for definitive revascularization procedures. Furthermore, their use may be contraindicated in diabetics, as these agents can intensify hypoglycemia while masking hypoglycemic symptoms. Sublingual nitroglycerin is helpful in managing the anginal pain of coronary artery disease but does nothing to alter the course of the disease or decrease mortality.

Angioplasty is not an option in the therapy of left main disease, since inflating the balloon completely occludes the lumen of the artery and transiently interrupts all blood

flow to the myocardium.

19. A 28-year-old man presents to the ER with fever, chills, and malaise for the past 3 days. He also complains of nausea, headaches, and anorexia. The patient admits occasional IV drug use. Examination of his palms and soles reveals painless macules; on auscultation, a loud holosystolic murmur is noted. **Which of the following is the most appropriate next step in diagnosis?**

- A. Cardiac catheterization
- B. Chest CT scan with contrast
- C. ECG
- D. Echocardiogram
- E. Test for syphilis

The correct answer is D. This patient is displaying signs and symptoms of acute infective endocarditis, with fever, chills, a heart murmur, Janeway lesions, and a positive history of drug use. A thoracic echocardiogram is the most appropriate first step for finding the vegetations on heart valves, which are diagnostic. Blood cultures are also diagnostic, but take 2 days for a result and confirm only the bacteremia itself, not its source. Since the mortality is great, empiric antibiotics should be initiated after three sets of blood cultures are drawn. The organism is most likely *Staphylococcus aureus*, and the right-sided valves are more commonly affected in IV drug users. The tricuspid regurgitation murmur (a holosystolic murmur along the sternal border that increases with inspiration) should always suggest the diagnosis of *S. aureus* endocarditis. ECG findings are not sensitive for diagnosing endocarditis. There is no role for CT or cardiac catheterization in this case. The findings do not suggest syphilis.

20. A 55-year-old woman presents to the ER because of chest pain. The pain, which has lasted 3 hours, is substernal and dull in nature, with no relation to respiration or position. The pain does not radiate and is accompanied by weakness, lightheadedness, and nausea. She has received oxygen, aspirin, a continuous infusion of nitroglycerin, and a beta blocker. Her chest x-ray film is normal, and her ECG is remarkable for inverted T waves in leads II, III, and aVF. **Which of the following is the most important next step in management?**

- A. Cardiac catheterization
- B. Heparin
- C. IV thrombolytic therapy
- D. Nifedipine
- E. Percutaneous coronary angioplasty

The correct answer is B. The patient has unstable angina or non ST elevation MI. Unstable angina with ECG changes is associated with critical coronary artery stenosis in most cases. One goal of therapy is to prevent thrombus formation on complex atherosclerotic plaques; heparin is the most effective proven treatment to prevent progression of unstable angina to myocardial infarction. Heparin may cause delayed thrombocytopenia in about 10% of cases.

Nifedipine, a calcium-channel blocker, has no proven benefit in the therapy of acute myocardial infarction. The drug decreases afterload and may cause a reflex tachycardia. The patient does not meet the criteria for thrombolytic therapy. The best candidate for

thrombolytic therapy is one in whom the ECG has distinct regional ST segment elevation or new left bundle branch block. Thrombolytic therapy has not been shown to benefit patients with inverted T waves, ST segment depression, or nonspecific ST-T wave changes and chest pain.

The patient may eventually require catheterization to see the extent of the coronary artery disease, but it is not the appropriate next step in management. Angioplasty should be considered if chest pain refractory to medical management persists, but it is not the appropriate next step in management.

21. A 69-year-old man is treated for chest infection. He has been on a stable dose of warfarin for the last six months as a treatment for atrial fibrillation, with INR recordings between 2-2.5. However, his most recent INR was 5. Which one of the following drugs is likely to be responsible for his result?

A. Clarithromycin
B. Digoxin
C. Dipyridamole
D. Rifampicin
E. Temazepam

Correct answer is A. Clarithromycin induces the anticoagulant effect of warfarin, whereas rifampicin would reduce the anticoagulant effect. Ciprofloxacin and sulphonamides will also increase the anticoagulant effect of warfarin. Temazepam, digoxin and codeine have no appreciable effect.

22. A 59-year-old man who was active all his life develops sudden severe anterior chest pain that radiates to his back. Within minutes, he is unconscious. He has a history of hypertension, but a recent treadmill test had revealed no evidence for cardiac disease. Which of the following is the most likely diagnosis?

A. Acute myocardial infarction
B. Pulmonary embolus
C. Right middle cerebral artery embolus
D. Tear in the aortic intima
E. Tension pneumothorax

Correct answer is D. The history is typical of aortic dissection. All the others could cause sudden collapse but not with acute chest pain radiating to the back in the presence of a recent normal exercise test. Acute MI is possible but not the most likely.

23. A 74-year-old man has had increasingly severe, throbbing headaches for several months, centered on the right, and pain on chewing food. There is a palpable tender cord-like area over his right temple. His heart rate is regular with no murmurs, gallops, or rubs. Pulses are equal and full in all extremities; BP is 110/85 mmHg. He improves with a course of high-dose corticosteroid therapy. Which of the following laboratory test findings is most likely to be present with this disease?

A. Anti-double stranded DNA titer of 1:1024
B. Erythrocyte sedimentation rate of 110 mm/hr
C. HDL cholesterol of 23 mg/dl
D. pANCA titer of 1:160
E. Rheumatoid factor titer of 50 IU/mL

The correct answer is B. These are classic findings for temporal arteritis, the most typical involvement with giant cell arteritis. Corticosteroid therapy typically produces a reduction of symptoms. Not treating this condition puts the patient at risk for involvement of other branches of the "external carotid artery", the worst of which would be the ophthalmic branch.

24. A 59-year-old male presents with a 1 hour history of central crushing chest pain. He is known to be diabetic, hypertensive and is a non-smoker. On examination his pulse rate 90 beats/min, blood pressure 130/85 mmHg, S1 & S2 are audible with no murmurs. There is no evidence of cardiac failure. An ECG is performed and thrombolytic therapy is initiated. Which of the following would be expected to be present in his ECG?

A. Atrial fibrillation >150/min
B. Right bundle branch block
C. ST depression of 2 mm in leads II, III and AVF
D. ST elevation of 2 mm in V4-V6
E. Supraventricular tachycardia

The correct answer is D. This patient is having an acute myocardial infarction; the ECG changes of ST elevation of 2mm in V4-V6 suggest an anterolateral MI. Given this history and ECG changes he should be given thrombolytic treatment, along with aspirin, heparin, beta blockade, statin therapy and subsequent ACE inhibition. ECG criteria for thrombolysis include ST elevation of >1 mm in standard limb leads, ST elevation >2mm in anterior chest leads, new left bundle branch block within 24 hours of typical pain. Evidence beyond 12 hours of pain is equivocal. Thrombolysis at this time tends to be used if there is clinical deterioration or persistent pain.

25. A 35-year-old lady at 14 weeks gestation is found to have a blood pressure of 160/100 mmHg. Her father is known to have hypertension. Electrocardiogram demonstrates features of left ventricular hypertrophy. What is the most likely diagnosis?

- A. Eclampsia
- B. Essential hypertension
- C. Pre-eclampsia
- D. Pregnancy-induced hypertension
- E. Renal hypertension

The correct answer is B. ECG feature of LVH is the key, telling that her hypertension is not of recent onset, ruling out pregnancy-related causes. Of all types of hypertension, essential hypertension is the most prevalent. Her family history also supports the diagnosis

26. A 70-year-old woman has a history of dyspnea and palpitations for six months. An ECG at that time showed atrial fibrillation. She was given digoxin, diuretics and aspirin. She now presents with two short-lived episodes of altered sensation in the left face, left arm and leg. There is poor coordination of the left hand. ECHO was normal as was a CT head scan. What is the most appropriate next step in management?

- A. Anticoagulation
- B. Carotid endarterectomy
- C. Clopidogrel
- D. Corticosteroid treatment
- E. No action

The correct answer is A. This patient is having symptoms of transient ischemic attacks most likely due to a cardiac source of emboli. A normal Echo or CT head does not rule out thrombo-embolic events. There is an increased risk of strokes in patients with atrial fibrillation and hence with the given symptoms formal anticoagulation with warfarin should be considered.

27. A 48-year-old male is referred with impotence on Sildenafil. He has a history of angina, hypertension and type 2 diabetes. Which one of the following drugs that he takes would present a contra-indication?

- A. Aspirin
- B. Isosorbide Mononitrate
- C. Lisinopril
- D. Metformin
- E. Thiazide

The correct answer is B. Nitrates and Sildenafil are contra-indicated due to the precipitant drops in blood pressure. Sildenafil is also associated with increases in intra-ocular pressure so should be avoided in glaucoma, hereditary retinal disease and in those with hypotension.

28. A 50-year-old man with hypertension already on furosemide, Ramipril and digoxin is found to have poor left ventricular function on echocardiogram. Which antihypertensive should be added?

- A. Carvedilol
- B. Diltiazem
- C. Doxazosin
- D. Hydralazine
- E. Nifedipine

The correct answer is A. This patient has hypertension and reduced EF on echo indicating an element of failure. Under these circumstances, addition of a beta blocker would be the most appropriate agent with evidence to support its use for reducing morbidity and mortality.

29. A 45 year old male on treatment for chest infection presented with palpitations. ECG revealed prolongation of the QT interval and was told that there is increased risk of life threatening arrhythmia. Which of the following anti-microbial is responsible for his findings?

- A. Amoxi-Clav
- B. Cefuroxime
- C. Erythromycin
- D. Gentamicin
- E. Isoniazid

The correct answer is C. The macrolides are associated with a prolongation of the QT interval. Other antimicrobials associated with prolonged QT include quinine, levofloxacin.

30. A 60-year-old man with a history of controlled hypertension presents with acute onset weakness of his left arm, which resolved over 12 hours. He had suffered two similar episodes over the last three months. Examination reveals a blood pressure of 135/85 mmHg and pulse is 80/min with irregular irregularity. ECG reveals absent p wave. CT brain scan is normal. What is the most appropriate management?

- A. Amiodarone
- B. Aspirin
- C. Digoxin
- D. Dipyridamole
- E. Warfarin

The correct answer is E. This patient has had three transient ischemic attacks due to atrial fibrillation. The most appropriate therapeutic strategy for this patient would be warfarin. Studies reveal that warfarin would be therapeutically superior to aspirin in such a patient's case.

31. A 26-year-old professional footballer collapses while playing football. He is rushed to the ER, and is found to be in ventricular tachycardia. He is defibrillated successfully and his 12 lead ECG demonstrates normal sinus rhythm, without ST segment changes. Ventricular tachycardia recurs and despite prolonged resuscitation, he dies. **What is the most likely diagnosis?**

A. Aortic stenosis
B. Cocaine intoxication
C. Hypertrophic cardiomyopathy
D. Myocardial infarction
E. Pulmonary embolism

The correct answer is C. The history of sudden arrhythmia in a young previously well individual is suggestive of Hypertrophic cardiomyopathy. Relatives should be screened for the condition. There is no history to suggest drug abuse. Aortic stenosis is rare in the absence of congenital or Rheumatic heart disease. A myocardial infarction and massive pulmonary embolism would have given ECG changes.

32. A 34-year-old male presents with palpitations. The ECG shows a slurred upstroke in the QRS complexes in the chest leads. **What is the treatment of choice?**

A. Amiodarone
B. Aspirin
C. Diltiazem
D. Radiofrequency ablation
E. Warfarin

The correct answer is D. This patient has Wolff-Parkinson-White syndrome as suggested by the delta wave on ECG. Anticoagulation is not indicated. Risk of arrhythmia after ablation is of the order of 7% over 5 years.

33. A 56-year-old male with left ventricular systolic dysfunction was dyspneic on climbing stairs but not at rest. The patient was commenced on Ramipril and furosemide. **Which one of the following drugs would improve the patient's prognosis?**

A. Amiodarone
B. Amlodipine
C. Bisoprolol
D. Digoxin
E. Nitrate therapy

The correct answer is C. This patient has NYHA stage II heart failure. Studies revealed that beta blockers significantly reduce morbidity and mortality in heart failure.

34. A 62-year-old male undergoes cardioversion for idiopathic atrial fibrillation. Post-procedure he was shown to be in sinus rhythm. Medication at admission included Warfarin, digoxin and atenolol, which he had been taking for the last six weeks. **Which of the following agents should he continue to take until he is seen in clinic in six weeks' time?**

A. Aspirin
B. Atenolol
C. Digoxin
D. Sotalol
E. Warfarin

The correct answer is E. This patient has undergone successful cardio version for idiopathic AF and needs to remain on warfarin as his risk of further thromboembolism remains high up until six weeks after achieving sinus rhythm. This is due to the fact that his atria are now contracting. Digoxin is not required post procedure as neither it, nor atenolol, maintains sinus rhythm. Aspirin is not as good as warfarin in preventing thromboembolic disease. Sotalol, like amiodarone, is good at chemical cardioversion and maintaining SR but its role post cardioversion is uncertain.

35. A patient presents with atrial fibrillation and later reverts to sinus rhythm. He asked you about prognosis and recurrence. **Under which of the following circumstances is the patient more likely to remain in sinus rhythm?**

A. Age > 75 Years Old
B. Been Commenced On Warfarin
C. Left Atrium Size > 6 Cm On Echo
D. Short History Of AF
E. Ventricular Rate On Presentation Of 130 Bpm

The correct answer is D. The patient with very recent onset of atrial fibrillation is more likely to stay in sinus rhythm. Atrial fibrillation, in older patients is more likely to be associated with structural heart disease. Anticoagulation should have no effect on the risk of paroxysmal atrial fibrillation. An enlarged left atrium is unlikely to remain in sinus rhythm. Patients likely to have chronic atrial fibrillation include those presenting with a relatively slow ventricular rate, especially if they are not on beta blockers, calcium antagonists or digoxin.

36. A 60-year-old man presented with an episode of right sided weakness that lasted 10 minutes and fully resolved. Examination reveals that he is in atrial fibrillation. **Which of the following is the most appropriate management regime?**

A. Aspirin
B. No additional drug treatment
C. Warfarin, INR range 2 - 3
D. Warfarin, INR range 2 - 3 for 6 months then aspirin
E. Warfarin, INR range 3-4

The correct answer is C. This is a high risk patient for future stroke and should be anti-coagulated with warfarin. An initial target range of INR 2 - 3 is the most appropriate.

37. A 40-year-old female with mitral stenosis consults for advice regarding operative procedures. In which of the following circumstances would antibiotic prophylaxis of infective endocarditis be required?

- A. Caesarian section
- B. Cardiac catheterization
- C. Dental scaling
- D. Removal of a lipoma
- E. Termination of pregnancy

The correct answer is C. Dental scaling is regarded as a high risk procedure and should be covered by antibiotic prophylaxis.

38. A 58-year-old man presents with sudden onset chest pain. He has a known history of ischemic heart disease. ECG shows ST segment elevation in V1-V5 without reciprocal depression. In which territory is the infarction most likely to have taken place?

- A. Anterior
- B. Inferior-lateral
- C. Inferior
- D. Lateral
- E. Posterior

The correct answer is A. This MI is likely to be in the LAD artery and represents an anterior myocardial wall infarction.

39. A 21 year-old woman has a history of palpitations and light headedness. ECG shows short PR interval and inferior leads Q waves. Her symptoms improve with atenolol 25 mg/day but she has had two short episodes of similar symptoms in the previous 24 hours. What is the long-term management of choice?

- A. Anticoagulation.
- B. Increase the dose of atenolol.
- C. Oral amiodarone
- D. Oral digoxin.
- E. Radiofrequency ablation

The correct answer is E. WPW can be associated with negative delta waves in II, III and aVF. The long term management of choice is ablation of the accessory pathway.

40. A 68-year-old lady presents for review of her heart failure treatment. She has a blood pressure of 165/90. She is currently taking furosemide and aspirin and she experiences dyspnea on walking up hills. Which of the following is the most appropriate medication to add?

- A. Bendroflumethiazide
- B. Enalapril
- C. Isosorbide mononitrate
- D. Spironolactone
- E. Titrate dose of furosemide

The correct answer is B. ACE inhibitors remain one of the cornerstones of the treatment of heart failure. There is clear evidence that higher doses exert greater benefit. They are usually very well tolerated, especially in milder cases.

41. A 60-year-old man has left ventricular failure and clinically he is classified as NYHA Class III. He takes furosemide, aspirin and Ramipril. The addition of which one of the following would be expected to further improve his prognosis?

- A. Acebutolol
- B. Bisoprolol
- C. Esmolol
- D. Propranolol.
- E. Sotalol

The correct answer is B. Bisoprolol is a highly selective β_1 adrenal receptor antagonist. Administration of Bisoprolol to patients with chronic heart failure is associated with increases in left ventricular function and reductions in heart rate.

42. A 65-year-old man presents with severe central crushing chest pain. ECG shows evidence of an inferior myocardial infarction. He receives tissue Plasminogen activator (tPA), Heparin and Aspirin. Four hours after initial presentation, he starts feeling dizzy and breathless. His pulse is 40 bpm regular, BP 80/50. Heart sounds are soft and chest clear to auscultation. ECG shows 2:1 AV block with T wave inversion inferiorly. IV atropine was administered but had no effect. What is the next most important treatment?

- A. Insert a permanent pacemaker.
- B. Insert a temporary pacemaker.
- C. IV Dopamine.
- D. IV Isoprenaline.
- E. Monitor his progress.

The correct answer is B. This patient has had an inferior MI which is commonly associated with conduction abnormalities. He now develops heart block which leaves him with bradycardia, symptomatic and with a low BP. Isoprenaline is contraindicated in acute MI due to its positive inotropic effects and arrhythmogenic potential. Temporary pacing would deal with the situation until the inferior MI has fully resolved. He is unlikely to need a Permanent Pacemaker.

43. A 72-year-old woman presented with acute severe chest pain with an ECG revealing ST segment elevation in leads II, III and aVF. She was treated with thrombolysis but two days later became acutely unwell. Examination revealed a loud systolic murmur at the apex which radiated into the axilla with associated pulmonary edema. What is the most likely diagnosis?

- A. Acute left ventricular failure
- B. Cardiogenic shock
- C. Pericarditis
- D. Ruptured papillary muscle
- E. Ventricular septal defect

The correct answer is D. The most likely explanation in this patient with a prior inferior myocardial infarct is mitral valve prolapse due to papillary muscle rupture

44. A 70-year-old male was receiving amiodarone 200 mg daily for intermittent atrial fibrillation. However, he was aware of tiredness and lethargy. He appeared clinically euthyroid with no palpable goiter. Investigations revealed:

Serum total T4	23 nmol/L (9-26)
Serum total T3	0.8 nmol/L (0.9-2.8)
Serum TSH	8.2 mU/L (<5)

Which of the following statements would explain these results?

- A. Abnormal thyroxin binding globulin
- B. Amiodarone-induced hypothyroidism
- C. Sick euthyroid syndrome
- D. Spontaneous hypothyroidism
- E. TSH secreting pituitary adenoma

The correct answer is B. The results show normal T4, low T3 with elevated TSH. These results are typical of amiodarone induced hypothyroidism which inhibits the peripheral conversion of T4 to T3.

45. 72-year-old man with type 2 diabetes mellitus presented following the sudden onset of palpitations. An ECG revealed rate of 180/min, irregular QRS with absent p wave. He was commenced on Amiodarone with no improvement. Which of the following has been shown to be of greatest benefit in reducing his future risk of vascular events?

- A. Anticoagulation
- B. Aspirin
- C. Continuation of Amiodarone
- D. DC cardioversion
- E. Digoxin

The correct answer is A. Both sustained and paroxysmal atrial fibrillations are associated with a relatively high incidence of thromboembolism and stroke. Clinical trials have demonstrated that warfarin reduces the risk of stroke in patients with AF. This benefit outweighs the risk of bleeding.

46. A 19-year-old girl presents with recurrent episodes of loss of consciousness. Over the last two years she has had blackouts which last approximately 2 minutes. They typically occur when she is standing. These have occurred more frequently over the last week. The last episode was witnessed by her mother who noted that she collapsed without any abnormal movements. On coming round she was rather drowsy initially but generally fine and recovered relatively quickly. What is the most likely diagnosis?

- A. Addison's disease
- B. Atonic seizures
- C. Cardiac syncope
- D. Complex partial seizures
- E. Vasovagal syncope

The correct answer is E. This young girl has features suggestive of vasovagal syncope. The story suggests that the episodes always occur when she is standing (whereas cardiac syncope could occur at any time but may be precipitated by exercise). Absence of abnormal movements makes epilepsy less likely. Finally, full recovery makes epilepsy less likely.

47. An elderly man with a history of asthma, congestive heart failure, and peptic ulcer disease is admitted with bronchospasm and rapid atrial fibrillation. He receives frequent nebulized salbutamol and IV digoxin loading. His regular medications are continued. Twenty four hours after admission, his serum potassium is noted to be 2.8 mEq/L. Which one of his medications is most likely to have caused this abnormality?

- A. ACE inhibitor
- B. Digoxin
- C. Ranitidine
- D. Salbutamol
- E. Spironolactone

The correct answer is D. Salbutamol given in regular nebulized doses or IV is commonly associated with hypokalemia. Spironolactone and ACE inhibitors commonly cause hyperkalemia. Their use in combination is potentially dangerous and requires regular monitoring of serum electrolytes. Electrolyte disturbance with Ranitidine is very uncommon. Digoxin doesn't cause hypokalemia (unless due to vomiting associated with digoxin toxicity). Hypokalemia (usually diuretic induced) does increase cardiac sensitivity to Digoxin and correction of hypokalemia is recommended to avoid arrhythmias.

48. A 60-year-old diabetic male presents for follow up after having sustained a myocardial infarction five years previously. He takes metformin 500 mg t.d.s., Bendroflumethiazide 2.5 mg daily and aspirin 150 mg daily. His body mass index is 33.5 kg/m^2 , with a pulse of 82 beats per minute, regular and a blood pressure of 155/95 mmHg. His cholesterol concentration is 132 mg/dl. What is the most appropriate strategy for this patient?

- A. 24 hour ambulatory ECG
- B. Atorvastatin
- C. Increase aspirin to 300 mg daily
- D. Orlistat
- E. Ramipril

The correct answer is E. The most appropriate strategy for secondary prevention would involve further blood pressure reduction with an ACE inhibitor which would not only reduce CV risk but also reduce microvascular risk. Studies suggest cholesterol less than 120 mg/dl yet this patient already has a low cholesterol level, hence would not benefit from the addition of a statin. The increase of aspirin from 150 to 300 mg would offer no added advantage. Orlistat is used under specific criteria for weight reduction and has, as yet, not been shown to reduce CV risk in T2DM. There's no reason here for a 24 hr ECG monitoring.

49. A middle aged woman presents with new onset palpitations. She also commented that she had lost weight recently despite an increased appetite. Examination reveals goiter and a degree of exophthalmos. During physical examination, she fell unconscious. Blood pressure was 70/40 mmHg. Electrocardiogram revealed atrial fibrillation with rapid ventricular response. What is the appropriate immediate management?

- A. Anticoagulation
- B. Carbimazole
- C. DC cardioversion
- D. Intravenous amiodarone
- E. Intravenous propranolol

The correct answer is C. The patient is hemodynamically compromised due to AF. The emergency management is DC cardioversion using 200J-360J. Adverse signs necessitating DC cardioversion are BP \sim 90mmHg, chest pain, heart failure, impaired consciousness and heart rate $>$ 200bpm.

50. A 50-year-old female presents with dyspnea, a new murmur and fever and positive blood culture. Antibiotics were started according to culture and sensitivity. Which of the following investigations is used to monitor the treatment?

- A. Blood culture
- B. C Reactive Protein
- C. Echocardiography
- D. Erythrocyte Sedimentation Rate
- E. Serum bactericidal titers of antibiotics.

The correct answer is B. Serum bactericidal titers against the infecting organism are no longer recommended. There's always great variation in the monitoring methods used for these tests and in the interpretation of their results. At best they could only predict bacteriological, not clinical cure and bacteriological failure is very rare. The most useful laboratory test for monitoring the response to treatment (which is usually obvious clinically) is serial C-reactive protein estimation. This is of much more use than the erythrocyte sedimentation rate, which is much slower to fall.

52. A 74-year-old man presented with acute pain, pallor and absent pulses in his right leg. Investigations revealed an embolus in his femoral artery. What is the most likely source?

- A. Marantic endocarditis
- B. Paradoxical emboli
- C. Rheumatic endocardial vegetations
- D. Right ventricular thrombi
- E. Thrombi from an atheromatous aorta

The correct answer is E. Ulceration of an atheromatous plaque of the abdominal aorta is the most common source of emboli in this situation. Right ventricular thrombi would embolize to the lung. The others are possible but less likely causes.

53. A 54-year-old man presents with central crushing chest pain. Examination is normal. 12-lead ECG shows ST segment elevation in leads II, III, aVF and ST depression in V1, V2 and V3. Which coronary artery is occluded?

- A. Circumflex
- B. Left Anterior Descending
- C. Left Main Stem
- D. Obtuse Marginal
- E. Right Coronary Artery

The correct answer is E. The ECG describes an inferior-posterior MI. This territory is supplied by a dominant Right Coronary Artery. The concept of coronary dominance refers to which coronary artery supplies the posterior descending coronary artery. In approximately 85% of patients, it is the right coronary artery with about 15% of patients having a dominant left circumflex. The territories supplied by the arteries are as follows:

- **Circumflex:** Lateral
- **Left Anterior Descending:** Anterior and septum
- **Left Main Stem:** Branches into the Left Anterior Descending artery and Circumflex artery and supplies most of the left ventricle. Complete Left Main Stem occlusion is invariably fatal.
- **Obtuse Marginal:** One of the branches of the circumflex and supplies the high lateral region of the left ventricle (ECG leads I and aVR).

Basic understanding of coronary anatomy is important, as this is predictive of problems following MI. For example, the right coronary artery supplies the AV node, so heart block following inferior MI is common. However, heart block following anterior MI is

a grave prognostic marker as this indicates a large anterior wall infarct. The right coronary system also supplies the right ventricle; hence problems relating to a right ventricular infarct are commonly associated with an inferior MI.

54. A 70-year-old woman, with harsh ejection systolic murmur propagated to the neck and cardiac apex, attends for annual review. Which one of the following factors is the most important in deciding the timing of surgery?

- A. Aortic valve gradient of 50 mmHg
- B. Left ventricular hypertrophy
- C. The intensity of the murmur
- D. The Patient's symptomatology
- E. Valvular calcification

The correct answer is D. The patient's symptomatology is probably the most important determinant in terms of the decision to operate. Dyspnea, chest pain and syncope are all features of aortic stenosis and when present suggest a poor prognosis if left. A gradient of 50mmHg would be regarded as moderate - severe aortic stenosis but if asymptomatic nothing would be done. LVH is a common feature of AS and does not influence the decision for surgery. Calcific aortic disease is not of itself important and the gradient should be considered.

55. A 65-year-old male with left ventricular systolic dysfunction was dyspneic on climbing stairs but not at rest. The patient was commenced on Ramipril and Furosemide. Which one of the following drugs would improve the patient's prognosis further?

- A. Amiodarone
- B. Digoxin
- C. Diltiazem
- D. Isosorbide Mononitrate
- E. Metoprolol

The correct answer is E. This patient has NYHA grade II heart failure and is already receiving ACE-Inhibitors and diuretics. Studies clearly demonstrate the advantage of beta blockers even with severe heart failure.

56. A 55-year-old woman has had worsening shortness of breath for several years. She now has to sleep sitting up on two pillows. She has difficulty swallowing. There is no history of chest pain. She is afebrile. Recently, she suffered a stroke with left hemiparesis. A chest X-ray reveals a near-normal left ventricular size with a prominent left atrial border. Which of the following conditions is most likely to account for these findings?

- A. Aortic Coarctation
- B. Cardiomyopathy
- C. Essential hypertension
- D. Left renal artery stenosis
- E. Mitral valve stenosis

The correct answer is E. Mitral valve stenosis leads to left atrial enlargement, but the left ventricle is usually small. An enlarged left atrium may lead to pressure posteriorly on the esophagus. Most mitral valvular disease in adults results from rheumatic heart disease.

57. A 65-year-old man has an ejection systolic murmur and narrow pulse pressure on clinical examination. There is no history of chest pain, breathlessness or syncope. An ECHO confirms aortic stenosis and shows an aortic valve gradient of 40mmHg. There is good left ventricular function. Which of the following management options is the most appropriate choice in this case?

- A. Anticoagulation
- B. Aortic valve plasty
- C. Follow - up
- D. Routine aortic valve replacement
- E. Urgent aortic valve replacement

The correct answer is C. Indications for surgery in aortic stenosis include a gradient of 50 mmHg or more, or associated symptoms such as syncope, breathlessness and episodes of pulmonary edema. This patient should be monitored in cardiology clinic so that a decision on the timing of valve surgery can be made.

58. A 69-year-old woman admitted for a surgical procedure is noted to have a soft systolic murmur at the left sternal edge. Her ECG and chest X-ray were normal and transthoracic echocardiography revealed a small posterior pericardial effusion with normal valves. Which of the following would be the most appropriate next step in this patient's management?

- A. A diagnostic Pericardial aspiration
- B. Mammography
- C. Purified Protein derivative test for tuberculosis
- D. Reassurance
- E. Right heart catheterization.

The correct answer is D. The presence of a small pericardial effusion on echo is quite common. In those who otherwise appear well, no further action is required.

59. A 50-year-old male is admitted with a 3 hour history of central chest pain sweating and nausea. He has no relevant past medical history although his father died of an MI at the age of 48 and he is a smoker of 5 cigarettes per day. He currently takes no medication. After admission his pain has settled. Examination reveals no specific abnormality and his ECG is normal. Which of the following investigations would be most appropriate for this patient?

- A. Coronary Angiography
- B. Echocardiography
- C. Endoscopy
- D. Exercise ECG
- E. Troponin

The correct answer is E. This smoker has a good history of angina and a strong family history of IHD. The most appropriate investigation would be a troponin concentration. This is highly specific and sensitive for IHD if elevated. An exercise test is relevant only after an acute coronary event has been excluded by troponin. If positive then angiography should be performed.

60. A 57-year-old man develops deep venous thrombosis during a hospitalization for prostatectomy. He exhibits decreased mental status with right hemiplegia, and a CT scan of the head suggests an acute cerebral infarction in the distribution of the left middle cerebral artery. A chest X-ray reveals cardiac enlargement and prominence of the main pulmonary arteries that suggests pulmonary hypertension. His serum troponin I is <0.4 ng/ml. Which of the following lesions is most likely to be present on echocardiography?

- A. Coarctation of the aorta
- B. Dextrocardia
- C. Pulmonary stenosis
- D. Tetralogy of Fallot
- E. Ventricular septal defect

The correct answer is E. This is a paradoxical embolus from right to left. This can only happen if there is a defect that allows passage from right-to left. This can happen across a patent foramen oval. In this case, the pulmonary hypertension suggests that there may have been a shunt persistent for a long time - Eisenmenger's complex. An atrial or a ventricular septal defect can provide the shunt.

61. A 16-year old girl was incidentally found to have delta wave and short PR interval on ECG. There was no tachycardia and she was asymptomatic. What is the next step in management?

- A. Beta-blocker therapy
- B. Electrophysiological study and provocation of arrhythmia
- C. Radiofrequency catheter ablation of the bypass tract
- D. Reassurance
- E. Repeat ECG

The correct answer is C. The ECG appearances of a delta wave occur in approximately 1.5 per 1000 of the population, yet many individuals never experience paroxysmal tachycardia. The degree of pre-excitation during sinus-rhythm is variable. It may be intermittent if the refractory period of the accessory pathway is close to the sinus cycle length, or unapparent if the delta wave is obscured due to rapid AV nodal conduction. Radiofrequency catheter ablation of bypass tracts is possible in $>90\%$ of patients and is the treatment of choice in patients with symptomatic arrhythmias.

62. A 30-year-old man presents with a history of transient loss of consciousness and palpitations. His ECG shows wide QRS complex regular tachycardia. Which of the following treatments should be avoided?

- A. Adenosine
- B. Amiodarone
- C. DC cardioversion
- D. Flecainide
- E. Verapamil

The correct answer is C. Verapamil should be avoided in cases of VT because it can cause a catastrophic fall in blood pressure. Adenosine is useful diagnostically when the diagnosis of regular wide complex tachycardia is in doubt. Amiodarone is a useful antiarrhythmic agent though its use acutely is limited by its irritant nature on veins. DC cardioversion is probably the treatment of choice in this case. Flecainide is a good antiarrhythmic and would be indicated in patients without LV failure (it is associated with an increased risk of death in such cases). Flecainide is widely used for atrial fibrillation.

63. A 62-year-old man has experienced substernal chest pain upon exertion with increasing frequency over the past 1 year. An electrocardiogram shows T wave inversion in the anterolateral leads at rest. He has total serum cholesterol of 280 mg/dl. On angiography, he has an 85% narrowing of the left anterior descending artery. Which of the following events is most likely to occur in this patient?

- A. A systemic artery embolus from a left atrial mural thrombus.
- B. A systemic artery embolus from a left ventricular mural thrombus.
- C. A systemic artery embolus from thrombosis in a peripheral vein.
- D. Pulmonary embolism from a left ventricular mural thrombus
- E. Pulmonary embolism from thrombosis in a peripheral vein.

The correct answer is B. The suggestion here is that this man has coronary artery disease with an impending myocardial infarction. Infarction of the LAD would cause necrosis of the left ventricle. Thrombus may form on an area of dyskinesia of ventricle. Therefore, he is most at risk of embolus of thrombus from the LV.

64. A 50-year-old female presents with dyspnea, a new murmur and fever and positive blood culture. Which of the following is associated with the best prognosis?

- A. Aortic valve infection
- B. Culture negative endocarditis
- C. Low complement levels
- D. Staphylococcus aureus infection
- E. Streptococcus viridians infection

The correct answer is E. Features suggestive of a worse prognosis are acute endocarditis (Staphylococcus aureus), heart failure, IV drug abuse (often left and right sided disease), prosthetic valve infection, infection of the aortic rather than mitral valve, associated rhythm disturbance. Sub-acute bacterial endocarditis (streptococcus viridians) has a better prognosis.

65. A 58 year-old male is admitted with a blood pressure of 210/120, headache, sweating and episodic runs of ventricular tachycardia. Investigations confirm the presence of a right adrenal mass. Which one of the following would be the most appropriate initial therapy?

- A. Amiodarone
- B. Atenolol
- C. Lidocaine
- D. Phenoxybenzamine
- E. Propofenone

The correct answer is D. This patient has catecholamine-induced severe hypertension and associated paroxysmal ventricular tachycardia. The patient should initially be alpha-blocked with Phenoxybenzamine and then beta-blockers introduced. This should control the runs of VT but for sustained VT lidocaine can be acutely used.

66. A 68 year-old woman, with rapid irregular palpitations and hypotension, is admitted for DC cardioversion. The procedure resulted in successful restoration of sinus rhythm. Which one of the following drugs should be added?

- A. Amiodarone
- B. Digoxin
- C. Diltiazem
- D. Sotalol
- E. Verapamil

The correct answer is A. Amiodarone has been shown to be superior in maintaining sinus rhythm following "DC cardioversion for AF". However, it is associated with more toxic side effects than the other agents mentioned. Neither verapamil, diltiazem nor digoxin would be expected to maintain sinus rhythm to any significant extent. Sotalol may be considered as a possible therapy but is less effective than amiodarone.

67. A 40 year old woman coming for check-up. During auscultation of her heart, you discover a wide fixed splitting of the second heart sound. Which of the following conditions should be raised?

- A. An uncomplicated ASD.
- B. Aortic stenosis.
- C. Constrictive pericarditis.
- D. Fallot's tetralogy.
- E. Right Bundle Branch Block.

The correct answer is A. There is a single sound in ASD because of an absent P2. Aortic stenosis leads to reversed splitting (also seen with LBBB and ventricular pacemaker). In RBBB there is wide splitting of S2 but it is not fixed.

68. A 72-year-old man noted to have an ejection systolic murmur over the 2nd Rt. intercostal space propagated to the neck. Which of the following is associated with a poor prognosis in this patient?

- A. Aortic regurgitation
- B. Cardiomegaly on chest X-ray
- C. Clinical features of left ventricular failure
- D. ECG evidence of left ventricular hypertrophy
- E. Severe valvular calcification on echocardiogram

The correct answer is C. Aortic stenosis is associated with a worse prognosis when accompanied by left ventricular dysfunction. Other predictors of a poorer prognosis include increasing gradient across the valve, age of patient and symptomatology. Although the severity of valvular calcification is prognostically important in an asymptomatic patient, the most important predictor is LV function.

69. A 25-year-old previously healthy woman has worsening fatigue with dyspnea, palpitations, and fever over the past one week. Her vital signs on admission to the hospital show temperature 38.9°C, respiratory rate 30/min, pulse 105 bpm, and BP 95/65 mmHg. Her heart rate is irregular. An ECG shows diffuse ST-T segment changes. A Chest X-ray shows mild cardiomegaly. An echocardiogram shows slight mitral and tricuspid regurgitation but no valvular vegetations. Her troponin I is 12 ng/ml (NR<0.04). She recovers over the next two weeks with no apparent sequelae. Which of the following laboratory test findings best explains the underlying etiology?

- A. ANCA titer of 1:80
- B. Anti-streptolysin O titer of 1:512
- C. Blood culture positive for Streptococcus, viridians group
- D. Coxsackie B serologic titer of 1:160
- E. Total serum cholesterol of 384 mg/dl.

The correct answer is D. She has findings that suggest myocarditis, and is supported by the temperature, echo findings and markedly raised troponin. Myocarditis can have features similar to cardiomyopathy and the mild valvular disease is quite compatible. One of the most likely organisms is Coxsackie B virus.

70. A 51-year-old woman has had several syncope episodes over the past year. Each episode is characterized by sudden but brief loss of consciousness. She has no chest pain. She has no ankle edema. On brain MRI there is a 1.5 cm cystic area in the left parietal cortex. A chest X-ray shows no cardiac enlargement, and her lung fields are normal. Her serum total cholesterol is 260mg/dl. Which of the following cardiac lesions is she most likely to have?

- A. Cardiac amyloidosis
- B. Ischemic cardiomyopathy
- C. Left atrial myxoma
- D. Mitral valve prolapse
- E. Tuberculous pericarditis

The correct answer is C. Atrial myxoma is more often found on the left side. Though benign, they can occlude the mitral valve and produce sudden loss of cardiac output. They may embolize small portions of themselves or thrombi formed over their surface.

71. A 70-year-old man with dilated cardiomyopathy remains symptomatic in NYHA class 2 due to chronic heart failure. On examination his pulse is 90 regular, BP 140/90, heart sounds normal, chest auscultation did not reveal any abnormalities. He is currently taking Lisinopril 30 mg daily and Furosemide 80 mg daily. **What is the best treatment option?**

- A. Amiodarone
- B. Carvedilol
- C. Digoxin
- D. Spironolactone
- E. Valsartan

The correct answer is B. Beta blockers improve mortality and quality of life in chronic heart failure. They should be initiated once patients are stable and can be used in all classes of heart failure though they can cause an acute deterioration in patients who have very severe symptoms. They should be avoided in the acute setting. Spironolactone improves outcome and symptoms in severe (Class 3-4) chronic heart failure. Valsartan does not affect outcome as add on treatment. Digoxin may reduce hospitalization and improves Quality of life (QOL) but has a neutral benefit to mortality. Amiodarone, in the absence of arrhythmias, does not affect outcome.

72. A 65-year-old male attends clinic complaining of breathlessness. He has endstage cardiac failure due to dilated cardiomyopathy. Currently he takes Furosemide, Lisinopril and Carvedilol. **Which one of the following drugs should be added to his current therapy?**

- A. Digoxin
- B. Diltiazem
- C. Isosorbide Mononitrate
- D. Nicorandil
- E. Vitamin C

The correct answer is A. Digoxin has a positive inotropic effect, it can be used in patients with heart failure who are in sinus rhythm but remain symptomatic despite therapy with an ACE inhibitor, diuretic and beta blocker.

73. A 14-year-old boy presents with fever, fleeting arthritis. **Which of the following might contribute to diagnosis?**

- A. A CRP of 10
- B. A prolonged PR interval on ECG.
- C. Positive Romberg's sign.
- D. The finding of target lesions on the hands.
- E. The finding of tender nodules in the fingertips.

The correct answer is B. The modified Jones Criteria include: Finding of preceding

streptococcal infection (recent scarlet fever, raised ASOT or other streptococcal antibodies, positive throat swab for Group A Strep) **Plus:**

(A) MAJOR CRITERIA:

- Carditis
- polyarthritis
- Chorea
- Subcutaneous nodules
- Erythema marginatum.

(B) MINOR CRITERIA:

- Fever
- Arthralgia
- Previous history of rheumatic fever
- Elevated acute phase reactions
- Prolonged PR interval.

74. A 45-year-old female presents with a two day history of fever and joint pains. She has a past history of hypertension for which she is receiving anti-hypertensive. On examination, she has a temperature of 38°C, a facial rash and slight swelling with tenderness of the wrist and ankle joints. **Which of the following anti-hypertensive is most likely to be responsible for her presentation?**

- A. Alpha-methyl dopa
- B. Bendroflumethiazide
- C. Hydralazine
- D. Minoxidil
- E. Phenoxymethamine

The correct answer is C. The presence of fever, facial rash and arthralgia suggest a diagnosis of drug-induced SLE, with hydralazine being a well-recognized cause. Gout may be precipitated by Bendroflumethiazide and it also causes a photosensitivity rash but the two diagnoses together with a fever would be remote.

75. A 75 year-old woman presents with a two month history of episodic loss of vision in her right eye. Her ECG was normal and carotid duplex revealed a 50% stenosis of the right internal carotid artery. **What is the most appropriate treatment for this patient?**

- A. Aspirin
- B. Carotid endarterectomy
- C. Dipyridamole
- D. Prednisolone
- E. Warfarin

The correct answer is A. The patient experiences TIAs in the form of amaurosis fugax due to carotid artery stenosis. Carotid endarterectomy is only indicated if the stenosis is 70-99%. Aspirin is the treatment of choice and good control of all vascular risk factors. Warfarin is not indicated unless the patient is in AF.

76. A 60-year old-man presents with features of left ventricular failure. He is comfortable at rest but ordinary physical activity results in fatigue and shortness of breath. Which of the following New York Heart Association's classifications best match the severity of this man's disease?

- A. NYHA Class I
- B. NYHA Class II
- C. NYHA Class III
- D. NYHA Class IV
- E. NYHA Class V

The correct answer is B. "Class II patients with cardiac disease resulting in slight limitation of physical activity. They are comfortable at rest. Ordinary physical activity results in fatigue, palpitation, dyspnea or anginal pain."

77. A 29-year-old female attends ER complaining of acute onset of palpitations. She is attached to a cardiac monitor and her pulse rate is 150 bpm. She is warm and well perfused, her BP is 135/80 mmHg, respiratory rate 20/min, oxygen saturation 100% on air and on auscultation her chest is clear with no evidence of cardiac failure. ECG shows a narrow complex tachycardia. Carotid massage and Valsalva maneuver have failed to attenuate the rhythm disturbance. What is the appropriate initial management?

- A. DC Cardioversion
- B. IV Adenosine
- C. IV Amiodarone
- D. IV Digoxin
- E. IV Magnesium

The correct answer is B. This patient has a narrow complex supraventricular tachycardia. From history and examination she is not hemodynamically compromised and, therefore, initial management would be IV adenosine in the absence of contraindication (e.g. asthma) in order to create a transient conduction delay. This may terminate the tachycardia, or cause a slowing in rate to allow identification of the underlying rhythm, to guide optimal anti arrhythmic therapy. If the patient had chest pain, hypotension, SBP <90 mmHg, or evidence of cardiac failure, then DC cardioversion would be indicated.

78. A 52-year-old male presents with a 3 week history of fever, deteriorating breathlessness and fatigue. Two years ago he underwent prosthetic valve replacement for a calcified bicuspid aortic valve. On examination he has a temperature of 37.7°C and four episodes of infarction. Vegetations are demonstrated through trans-esophageal echocardiography. Which of the following is the most likely causative organism?

- A. Candida spp.
- B. Enterococcus
- C. Staphylococcus aureus
- D. Staphylococcus epidermidis
- E. Streptococcus viridians.

The correct answer is E. Generally there are two identifiable modes of prosthetic valve endocarditis. The first occurs in the first year after surgery affecting 0.7-3% of cases and is often due to staphylococci. Late endocarditis observed after two years post-surgery is found in 0.5- 1% of cases and is typically due to streptococci, typically group A hemolytic streptococci, otherwise known as strep Viridians.

79. A 38 year old man with old TB presented with dyspnea. On examination BP 120/ 70 mmHg, Pulse 120 / min regular, and there is elevation of the jugular venous pressure during inspiration. Heart examination was unremarkable. What is most likely diagnosis?

- A. Constrictive pericarditis
- B. Cor - Pulmonale
- C. Dilated cardiomyopathy
- D. Hypertrophic cardiomyopathy
- E. Myocarditis

The correct answer is A. Kussmaul's sign (a rise in jugular venous pressure on inspiration - the opposite of normal) is seen in constrictive pericarditis.

80. A 51-year-old complains of dyspnea on exertion. He has distant heart sounds on auscultation of the chest. A chest radiograph reveals that there is a thin rim of calcification surrounding the cardiac outline. Which of the following conditions is most likely responsible for these findings?

- A. Coxsackie B virus
- B. Metastatic carcinoma
- C. Sarcoidosis
- D. Tuberculosis
- E. Uremia

The correct answer is D. The most likely diagnosis is a constrictive pericarditis. The most probable cause for this is previous tuberculous infection which may have occurred many years previously. Acute TB would usually cause a constrictive pericarditis secondary to a pericardial effusion, but is not normally associated with calcification. Uremia can cause a constrictive pericarditis, as can a pericardial malignancy, and Coxsackie virus (secondary to a pericarditis) but calcification would be unusual. Sarcoidosis can cause both pericarditis as well as restrictive cardiomyopathy but calcification would be unusual.

81. A 75-year-old lady presents with sudden breathlessness and palpitations. On examination, she was observed to have an irregular heart beat with rate of 140 bpm, BP 150/85 and normal heart sounds. On auscultation of the chest, fine basal crepitations are heard. An ECG absent p wave, q wave in lead II, III, and AVF with no ST changes. She is anti-coagulated with heparin and given diuretics. Her heart rate remains rapid. What is the most appropriate management of the lady?

- A. DC cardioversion
- B. IV amiodarone
- C. IV beta blocker
- D. IV digoxin
- E. Oral quinidine therapy

The correct answer is B: The key to this question is that the patient has clinical signs of pulmonary edema with fast AF. In this age group AF is poorly tolerated and often leads to pulmonary edema even in the presence of a relatively normal LV. NICE have published guidance on the treatment of AF. The primary aim here should be rate control which is best achieved with Amiodarone in this situation, Digoxin even when used IV is suggested to have too slowed onset of action to merit its use. Beta blockers can also be used but due to the fact that they are negatively inotropic may complicate the acute pulmonary edema. Emergency DCCV is not required as there is no hemodynamic compromise (BP) yet. Amiodarone allows DCCV to remain an option if hemodynamic compromise develops. It may be possible to cardiovert this patient in the long term depending on duration in AF, LA size, LVF, LVHD etc.

82. A 21-year-old man presents with abrupt onset of shortness of breath, mild chest pain and a sensation of rapid heart beating. The patient says that in the past he had similar episodes, which resolved with the Valsalva maneuver or breathe holding but not this time. An ECG documents narrow QRS complex tachycardia with a pulse of 200/min. Which of the following is the most appropriate next step in treatment?

- A. carotid sinus massage
- B. IV lidocaine
- C. IV procainamide
- D. IV verapamil
- E. Oral verapamil

The correct answer is D. Paroxysmal supraventricular tachycardia is the most common paroxysmal arrhythmia with a rapid heart rate. It is often associated with a perfectly normal heart. Depending on heart rate, manifestations may vary from a subjective sensation of increased heart rate to mild chest pain, shortness of breath, or syncope. The pulse is usually between 160 and 220/min. Patients may be instructed to carry out maneuvers that stimulate the vagal nerve (e.g., Valsalva maneuver, breath holding, and arm and body stretching) and may succeed in interrupting the attacks. Carotid sinus massage should be performed for 10-20 seconds on the patient in a semi-recumbent position and only on one side. Presence of carotid bruits is an absolute contraindication to carotid sinus massage. IV verapamil (a calcium channel blocker) or IV adenosine is the treatment of choice once other non-pharmacologic measures have been tried.

83. A 40-year-old man presents with recent onset exertional dyspnea. Blood pressure is 160/50 mmHg, pulse is 92/min. Cardiac examination reveals a prominent and laterally displaced apical impulse. A soft diastolic decrescendo murmur is heard along the left sternal border. Bilateral crackles are present at the lung base. Which of the following is the most likely diagnosis?

- A. Aortic insufficiency
- B. Aortic stenosis
- C. Hypertrophic obstructive cardiomyopathy
- D. Infective endocarditis
- E. Mitral stenosis

The correct answer is A. The patient manifests early left ventricular failure secondary to aortic regurgitation. The diastolic murmur is decrescendo along the left sternal border and the wide difference between systolic pressure and diastolic pressure is highly characteristic. The rapid rise and fall of peripheral pulses is known as Corrigan pulse. Similar hemodynamic changes (hyper-dynamic circulation) may be observed in hyperthyroidism, large arteriovenous fistulae, beriberi, and patent ductus arteriosus.

84. A healthy 25-year-old woman comes for a Check-Up visit. Cardiac auscultation reveals a low-pitch grade II-III mid-diastolic murmur over apex. Which of the following is the most appropriate next step in diagnosis?

- A. Antistreptolysin O titers
- B. Cardiac catheterization
- C. Doppler ultrasound
- D. Echocardiography
- E. Radionuclide angiography

The correct answer is D. The clinical presentation is consistent with mitral stenosis. Echocardiography is the technique of choice to evaluate mitral valve abnormalities; it can confirm an auscultatory diagnosis of mitral stenosis.

85. A 56-year-old man with a 5-year history of hypertension treated with diuretics and enalapril comes to medical attention because of right flank pain. His temperature is 37°C and blood pressure is 145/95 mm Hg. Physical examination shows tenderness in the right cost vertebral angle and bilaterally enlarged kidneys. A urine dipstick test reveals microhematuria. Which of the following is the most appropriate next step in diagnosis?

- A. CT scan of the abdomen.
- B. Cytological examination of urine.
- C. Intravenous pyelography (IVP).
- D. Renal biopsy.
- E. Ultrasonography.

The correct answer is E. The combination of hypertension and bilaterally enlarged kidneys is highly suggestive of autosomal dominant (adult) polycystic kidney disease, which is often associated with microhematuria as well. A positive family history may be present. Ultrasonography is the diagnostic procedure of choice.

86. A 59-year-old lady is admitted with a 30 minute history of heavy central chest pain associated with nausea and sweating. Her ECG shows ST elevation in leads VI, V2, V3 and V4. Which of the following coronary arteries is most likely to be occluded?

- A. Circumflex artery
- B. Left anterior descending artery
- C. obtuse marginal artery
- D. Posterior descending artery
- E. Right coronary artery

The correct answer is B. An antero-septal MI is due to an infarct in the territory of the Left Anterior descending artery.

Extended Matching Questions (EMQs)

1. Chest pain

- | | |
|----------------------------|---------------------------|
| A. Angina | H. Infective endocarditis |
| B. Aortic dissection | I. Lobar pneumonia |
| C. Atrial fibrillation | J. Pericarditis |
| D. Cardiac tamponade | K. Pneumothorax |
| E. Costochondritis | L. Pulmonary embolus |
| F. Esophageal spasm | M. Tension pneumothorax |
| G. Herpes zoster infection | |

For each clinical scenario below, give the most likely cause for the clinical findings. Each option may be used only once.

1. A 63-year-old man with a history of high blood pressure presents to the ER with sudden-onset tearing chest pain radiating to the back.
2. A 40-year-old woman develops sudden-onset dyspnea at rest following hip replacement surgery. On examination, she has tachycardia and her electrocardiogram (ECG) shows right axis deviation.
3. A 60-year-old man complains of central crushing chest pain radiating to both arms after running to catch a bus. Pain was relieved by rest and his ECG recording 1 h later was unremarkable.
4. A 21-year-old high-jumper presents with acute-onset dyspnea and right-sided pleuritic chest pain. Examination reveals increased resonance and reduced expansion on the right side.
5. A 23-year-old woman presents with localized left-sided chest pain that is exacerbated by coughing and is particularly painful on light pressure to that area. Pain is relieved by aspirin. The ECG is unremarkable.

Answers: B L A K E

1- A 63-year-old man with a history of high blood pressure presents to ER with sudden-onset tearing chest pain radiating to the back.

Answer is B: Pain can also radiate down the arms and into the neck and can be difficult to distinguish from an acute myocardial infarction. Indeed these symptoms are often associated with anterior arch or aortic root dissection. The dissection can interrupt flow to the coronary arteries, resulting in myocardial ischemia.

The Stanford classification divides dissections into two types: A and B.

Type A involves the ascending aorta but type B does not. This system also helps delineate treatment. Usually, type A dissections require surgery, whereas most type B dissections are usually best managed medically by aggressive reduction of blood pressure.

2- A 40-year-old woman develops sudden-onset dyspnea at rest following hip replacement surgery. On examination she has tachycardia and her ECG shows right axis deviation.

Answer is L: Patients can also present with signs of hypoxia, pyrexia and later hemoptysis. Look out for risk factors such as recent surgery and immobility in this patient.

3- A 60-year-old businessman complains of central crushing chest pain radiating to both arms after running to catch a bus. Pain was relieved by rest and his ECG recording 1 h later was unremarkable.

Answer is A: This is a classic description of angina. Pain is usually brought on by exertion but other recognized precipitants include cold weather and emotion.

4- A 21-year-old high-jumper presents with acute-onset dyspnea and right-sided pleuritic chest pain. Examination reveals increased resonance and reduced expansion on the right side.

Answer is K: Tall thin young men are especially at risk of having a pneumothorax. The trachea is deviated away from the affected side in a tension pneumothorax. In both simple pneumothorax and tension pneumothorax, expansion is reduced on the affected side. If tension pneumothorax is suspected do not perform a chest radiograph because it may delay emergency treatment. Patients with chronic obstructive pulmonary disease (COPD) are at risk of pneumothorax as a result of bullae rupturing.

5- A 23-year-old woman presents with localized left-sided chest pain that is exacerbated by coughing and is particularly painful on light pressure to that area. Pain is relieved by aspirin. The ECG is unremarkable.

Answer is E: Idiopathic costochondritis is also known as Tietze's syndrome. Localized tenderness to palpation is important for diagnosis. The second rib is frequently affected in this condition.

2. Pulse

- A. Acute CO 2 retention
- B. Aortic regurgitation
- C. Aortic stenosis
- D. Atrial fibrillation
- E. Atrial flutter
- F. Cardiac tamponade

- G. Coarctation of aorta
- H. Gaucher's disease
- I. Mitral regurgitation
- J. Mitral stenosis
- K. Mixed aortic valve disease
- L. Mixed mitral valve disease

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. Slow rising pulse, narrow pulse pressure, heaving apex beat and fourth heart sound. ☐
2. Collapsing pulse, wide pulse pressure, and 'pistol-shot' sound heard over femoral arteries. ☐
3. Radio-femoral delay in a patient with hypertension. ☐
4. Pulsus paradoxus, jugular venous pressure (JVP) rises on inspiration, heart sounds muffled. ☐
5. Bounding pulse in a patient who is short of breath. ☐

Answers: C B G F A

1- Slow rising pulse, narrow pulse pressure, heaving apex beat and fourth heart sound.

Answer is C: Angina, shortness of breath, dizziness and syncope on exertion are common presenting symptoms.

2- Collapsing pulse, wide pulse pressure, and 'pistol-shot' sound heard over femoral arteries.

Answer is B: Other signs include Corrigan's sign (carotid pulsation), de Musset's sign (head-nodding) and Quincke's sign (capillary pulsations in nail bed). These are all rare and were described at a time when valve replacement was not available.

3- Radio-femoral delay in a patient with hypertension.

Answer is G: This condition is twice as common in men and involves a narrowing of the aorta. Look out for the association with Turner's syndrome (45XO). A mid to late systolic murmur caused by turbulent flow can sometimes be heard over the upper part of the precordium. Narrowing of the aorta can result in the formation of a collateral arterial circulation, including the intercostal arteries. These arteries can erode the undersurfaces of ribs, giving rise to notched ribs on chest radiograph.

4- Pulsus paradoxus, JVP rises on inspiration, heart sounds muffled.

Answer is F: The signs of falling blood pressure, rising JVP on inspiration and muffled heart sounds are known as Beck's triad and are an indicator of cardiac tamponade/constrictive pericarditis.

5- Bounding pulse in a patient who is short of breath.

Answer is A: A bounding pulse is a feature of acute rather than chronic CO₂ retention. The mechanism involves reflex vasodilatation to provide adequate tissue perfusion. Hence, a bounding pulse can also be felt in a patient with sepsis (systemic vasodilatation).

3. Cardiac murmurs

- | | |
|-------------------------|------------------------------|
| A. Aortic regurgitation | H. Mitral regurgitation |
| B. Aortic stenosis | I. Mitral stenosis |
| C. Atrial fibrillation | J. Pericarditis |
| D. Atrial flutter | K. Tetralogy of Fallot |
| E. Atrial septal defect | L. Tricuspid regurgitation |
| F. Cardiomyopathy | M. Ventricular septal defect |
| G. Coarctation of aorta | |

For each clinical scenario below, give the most likely cause for the clinical findings. Each option may be used only once.

- Slapping apex beat, loud S₁, mid-diastolic murmur loudest at the apex in expiration lying on the left side. ☐
- Heaving un-displaced apex beat, absent A₂ with ejection systolic murmur radiating to the carotids. ☐
- Pan-systolic murmur heard best at lower left sternal edge during inspiration in a patient with pulsatile hepatomegaly. ☐
- Displaced, volume-overloaded apex. Soft S₁, pan-systolic murmur at the apex radiating to the axilla. ☐
- Left parasternal heave and harsh pan-systolic murmur at lower left sternal edge that is also audible at apex. ☐

Answers: C B G F A

1- Slow rising pulse, narrow pulse pressure, heaving apex beat and fourth heart sound.

Answer is C: Angina, shortness of breath, dizziness and syncope on exertion are common presenting symptoms.

2- Collapsing pulse, wide pulse pressure, and 'pistol-shot' sound heard over femoral arteries.

Answer is B: Other signs include Corrigan's sign (carotid pulsation), de Musset's sign (head-nodding) and Quincke's sign (capillary pulsations in nail bed). These are all rare and were described at a time when valve replacement was not available.

3- Radio-femoral delay in a patient with hypertension.

Answer is G: This condition is twice as common in men and involves a narrowing of the aorta. Look out for the association with Turner's syndrome (45XO). A mid to late systolic murmur caused by turbulent flow can sometimes be heard over the upper part of the precordium. Narrowing of the aorta can result in the formation of a collateral arterial circulation, including the intercostal arteries. These arteries can erode the undersurfaces of ribs, giving rise to notched ribs on chest radiograph.

4- Pulsus paradoxus, JVP rises on inspiration, heart sounds muffled.

Answer is F: The signs of falling blood pressure, rising JVP on inspiration and muffled heart sounds are known as Beck's triad and are an indicator of cardiac tamponade/constrictive pericarditis.

5- Bounding pulse in a patient who is short of breath.

Answer is A: A bounding pulse is a feature of acute rather than chronic CO₂ retention. The mechanism involves reflex vasodilatation to provide adequate tissue perfusion. Hence, a bounding pulse can also be felt in a patient with sepsis (systemic vasodilatation).

3. Cardiac murmurs

- | | |
|-------------------------|------------------------------|
| A. Aortic regurgitation | H. Mitral regurgitation |
| B. Aortic stenosis | I. Mitral stenosis |
| C. Atrial fibrillation | J. Pericarditis |
| D. Atrial flutter | K. Tetralogy of Fallot |
| E. Atrial septal defect | L. Tricuspid regurgitation |
| F. Cardiomyopathy | M. Ventricular septal defect |
| G. Coarctation of aorta | |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

- Slapping apex beat, loud S1, mid-diastolic murmur loudest at the apex in expiration lying on the left side. ☐
- Heaving un-displaced apex beat, absent A2 with ejection systolic murmur radiating to the carotids. ☐
- Pan-systolic murmur heard best at lower left sternal edge during inspiration in a patient with pulsatile hepatomegaly. ☐
- Displaced, volume-overloaded apex. Soft S1, pan-systolic murmur at the apex radiating to the axilla. ☐
- Left parasternal heave and harsh pan-systolic murmur at lower left sternal edge that is also audible at apex. ☐

Answers: I B L H M

1- Slapping apex beat, loud S1, mid-diastolic murmur loudest at the apex in expiration lying on the left side.

Answer is I: Mitral stenosis is a recognized complication of rheumatic heart disease. Mitral stenosis causing pulmonary hypertension and pulmonary valve regurgitation can result in an early diastolic murmur (Graham-Steel murmur). Mitral stenosis may be associated with symptoms of shortness of breath, chest pain, palpitations and hemoptysis. Atrial fibrillation is also a common finding. Other signs include a malar flush.

2- Heaving un-displaced apex beat, absent A2 with ejection systolic murmur radiating to the carotids.

Answer is B: Aortic stenosis is associated with a narrow pulse pressure and a quiet or absent second heart sound. Symptoms include angina, shortness of breath and syncope. Surgical correction by valve replacement is warranted by the patient's symptoms or the pressure gradient against the valve.

3- Pan-systolic murmur heard best at lower left sternal edge during inspiration in a patient with pulsatile hepatomegaly.

Answer is L: Infective endocarditis of the tricuspid valve is a well-recognized cause of tricuspid regurgitation in intravenous drug users. Giant systolic V waves may be seen in the JVP.

4- Displaced, volume-overloaded apex, and Soft S1, pan-systolic murmur at the apex radiating to the axilla.

Answer is H: Rheumatic heart disease is still a common cause of mitral regurgitation (MR) in developing countries. Mitral valve prolapse is a more common cause in the USA and Western Europe. MR may also develop acutely with myocardial infarction, secondary to papillary muscle rupture, which is often very poorly tolerated. The left ventricle is volume overloaded, increasing left-sided filling pressures and resulting in acute pulmonary edema and symptoms of dyspnea. Rarer causes of MR include the connective tissue diseases, e.g. Marfan's syndrome and Ehlers-Danlos syndrome.

5- Left parasternal heave and harsh pan-systolic murmur at lower left sternal edge that is also audible at apex.

Answer is M: Prevalence of ventricular septal defect (VSD) is around 2 in 1000 births. With a small VSD (maladie de Roger), the patient is asymptomatic and treatment is not required (apart from antibiotic prophylaxis against endocarditis for dental work, etc.). Spontaneous closure of the VSD is still possible with larger defects.

4. Cardiac Lesions

- | | |
|--------------------------------|------------------------------|
| A. Aortic regurgitation | G. Mitral stenosis |
| B. Aortic stenosis | H. Pulmonary stenosis |
| C. Atrial septal defect | I. Tricuspid regurgitation |
| D. Fallot's tetralogy | J. Tricuspid stenosis |
| E. Hypertrophic cardiomyopathy | K. Ventricular septal defect |
| F. Mitral regurgitation | |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. Slow rising carotid pulse, prominent left ventricular impulse, ejection click, ejection systolic murmur and fourth heart sound. Slow rising carotid pulse, prominent left ventricular impulse, ejection click, ejection systolic murmur and fourth heart sound. ☐
2. Bounding carotid pulse, laterally displaced apex, ejection systolic murmur, early diastolic murmur and third heart sound. ☐
3. Jerky carotid pulse, dominant 'a' wave in jugular venous pulse, double apical impulse, ejection systolic murmur at the base and pansystolic murmur at the apex. ☐
4. Elevated jugular venous pressure, early diastolic opening snap, mid diastolic murmur and loud first heart sound. ☐
5. Elevated jugular venous pressure, displaced apex, pansystolic murmur at the apex and third heart sound. ☐

Answers: B A E G F

1. Slow rising carotid pulse, prominent left ventricular impulse, ejection click, ejection systolic murmur and fourth heart sound. Slow rising carotid pulse, prominent left ventricular impulse, ejection click, ejection systolic murmur and fourth heart sound.

Answer is B: About 50% of cases of aortic stenosis are due to age-related calcification of the normal trileaflet valve. Other predisposing conditions include calcification of a congenital bicuspid aortic valve (30%–40% of cases) and acute rheumatic fever (< 10% of cases).

2. Bounding carotid pulse, laterally displaced apex, ejection systolic murmur, early diastolic murmur and third heart sound.

Answer is A: About 50% of cases of aortic regurgitation are due to aortic root dilatation, which is idiopathic in >80% of cases.

3. Jerky carotid pulse, dominant 'a' wave in jugular venous pulse, double apical impulse, ejection systolic murmur at the base and pansystolic murmur at the apex.

Answer is E: HCM is frequently asymptomatic until sudden cardiac death. Its prevalence is about 0.4% of the general population.

4. Elevated jugular venous pressure, early diastolic opening snap, mid diastolic murmur and loud first heart sound.

Answer is G: Almost all cases of mitral stenosis are secondary to rheumatic fever. The normal area of the mitral valve orifice is about 4–6 cm².

5. Elevated jugular venous pressure, displaced apex, pansystolic murmur at the apex and third heart sound.

Answer is F: Mitral regurgitation is the most common form of valvular heart disease. It has an incidence of approximately 2% of the population, affecting males and females equally.

5. Jugular venous pressure

- | | |
|------------------------------|-----------------------------------|
| A. Aortic regurgitation | G. Mitral stenosis |
| B. Aortic stenosis | H. Normal JVP |
| C. Atrial fibrillation | I. Superior vena cava obstruction |
| D. Complete heart block | J. Tricuspid regurgitation |
| E. Constrictive pericarditis | K. Tricuspid stenosis |
| F. Left heart failure | L. Ventricular fibrillation |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. Elevated JVP with absent pulsation.

2. Giant systolic 'v' waves.

3. Large 'a' waves and slow 'y' descent in JVP. Patient has ascites.

4. Cannon 'a' waves.

5. Raised JVP that rises on inspiration.

Answers: I J K D E

1- Elevated JVP with absent pulsation.

Answer is I: Bronchial carcinoma is a well-recognized cause of this medical emergency. Symptoms include early morning headache (feeling of fullness in the head) and signs include facial congestion and edema involving the upper limb. Either radiotherapy or chemotherapy may be useful depending on the sensitivity of the tumor type.

2- Giant systolic 'v' waves.

Answer is J: Tricuspid regurgitation is associated with giant systolic V waves. The V wave represents regurgitant blood ejected from the right ventricle at systole.

3- Large 'a' waves and slow 'y' descent in JVP. Patient has ascites.

Answer is K: Rheumatic fever is the most common cause of tricuspid stenosis. There is usually involvement of other valves, e.g. coexisting mitral stenosis. The prominent symptom is fatigue. The presence of shortness of breath suggests concomitant mitral valve disease. Surgical intervention by tricuspid valve replacement is usually carried out only when there are other defective valves also being operated on.

4- Cannon 'a' waves.

Answer is D: Cannon waves occur when there is atrio-ventricular (AV) dissociation. The classic example is complete heart block but it may also be seen in ventricular tachycardia. The cannon wave is generated by the atrium contracting in the presence of a closed tricuspid valve resulting from simultaneous ventricular systole.

5- Raised JVP that rises on inspiration.

Answer is E: Kussmaul's sign refers to the paradoxical rising of the JVP with inspiration. This sign can also be observed in cardiac tamponade. Usually the JVP falls as a result of the rise in intrathoracic pressure during inspiration.

6. ECG abnormalities

- | | |
|--|---------------------------------|
| A. Anterolateral myocardial infarction | H. Mitral regurgitation |
| B. Atrial fibrillation | I. Mitral stenosis |
| C. Heart block | J. Mobitz type II second-degree |
| D. Hyperkalemia | K. Pericarditis |
| E. Hypokalemia | L. Pulmonary embolus |
| F. Inferior myocardial infarction | M. Right bundle-branch block |
| G. Left bundle-branch block | N. Subendocardial infarction |

For each clinical scenario below, give the most likely cause for the clinical findings. Each option may be used only once.

1. A 26-year-old woman presents acutely unwell with shortness of breath. Her ECG shows sinus tachycardia, deep S waves in I, inverted T waves in III and Q waves in III. ☐
2. Dominant R in V1, inverted T waves in V1-V3, deep wide S waves in V6. ☐
3. Prolonged P-R interval, depressed ST, flattened T waves, prominent U waves. ☐
4. Sinus rhythm, bifid 'p' waves best seen in II, V3 and V4. ☐
5. A 65-year-old man presents with chest pain radiating to the jaw. The ECG shows ST segment elevation in II, III and aVF, with T-wave inversion in V5 and V6. ☐

Answers: L M E H F

1- A 26-year-old woman presents acutely unwell with shortness of breath. Her ECG shows sinus tachycardia, deep S waves in I, inverted T waves in III and Q waves in III.
Answer is L: This is the S I, Q III, T III pattern frequently quoted in books but it is actually rare in practice. Right axis deviation may be present but the ECG is often normal in small/medium pulmonary emboli.

2- Dominant R in V1, inverted T waves in V1–V3, deep wide S waves in V6.
Answer is M: The 'MARROW' pattern, e.g. 'RSR' pattern in V1 (M) with deep wide S wave in V6. Causes include atrial septal defect (ASD) and pulmonary embolus.

3- Prolonged P–R interval, depressed ST, flattened T waves, prominent U waves.
Answer is E: This occurs in hypokalemia. Look out for loop/Thiazide diuretics as a cause.

4- Sinus rhythm, with bifid 'p' waves best seen in II, V3 and V4.
Answer is H: Known as P mitrale. This bifid P wave suggests left atrial hypertrophy. A peaked P wave is called P pulmonale and suggests right atrial hypertrophy.

5- A 65-year-old man presents with chest pain radiating to the jaw. The ECG shows ST segment elevation in II, III and aVF, with T-wave inversion in V5 and V6.
Answer is F: ST segment elevation in II, III and aVF indicate inferior MI. Anterolateral MI would involve leads related to that portion of the heart, e.g. V4–V6, I, aVL.

7. ECG abnormalities

- | | |
|-------------------------------|------------------------------|
| A. Atrial fibrillation | H. Hypokalemia |
| B. Atrial flutter | I. Left bundle-branch block |
| C. Cardiac tamponade | J. Mitral regurgitation |
| D. E first-degree heart block | K. Normal ECG |
| E. Hypercalcemia | L. Right bundle-branch block |
| F. Hyperkalemia | M. Ventricular tachycardia |
| G. Hypocalcaemia | |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. ECG of a 55 year old being treated for hypertension shows tall tented T waves. ☐

2. A 34-year-old man presents to ER after a road traffic accident. The ECG shows pulseless electrical activity. ☐

3. An 85-year-old man with pneumonia complains of palpitations. ECG shows absent P waves. ☐

4. ECG of a 45-year-old man with sarcoidosis shows an 'M' pattern V5 and inverted T waves in I, aVL and V5–V6. ☐

5. ECG of a 12-year-old girl shows normal P waves and QRS complexes but shows T-wave inversion in V1. ☐

Answers: F C A I K

1- ECG of a 55 year old being treated for hypertension shows tall tented T waves.

Answer is F: Hyperkalemia. Look out for potassium-sparing diuretics and angiotensin-converting enzyme (ACE) inhibitors as a cause. Other causes include renal failure and metabolic acidosis.

2- A 34-year-old man presents to the ER after a road traffic accident. The ECG shows pulseless electrical activity.

Answer is C: Pulseless electrical activity (PEA) is a clinical condition characterized by loss of a palpable pulse in the presence of recordable cardiac electrical activity. PEA is also referred to as electromechanical dissociation (EMD). Given the history of trauma in this question, cardiac tamponade is the most likely cause. Management of PEA should follow current advanced life support guidelines while possible reversible causes are sought.

3- An 85-year-old man with pneumonia complains of palpitations. ECG shows absent P waves.

Answer is A: Absent P waves is the classic ECG finding of atrial fibrillation. This condition is associated with a significantly increased risk of an embolic event, e.g. stroke. Remember that hyperthyroidism is a cause of atrial fibrillation and thyroid function tests are indicated on first presentation.

Uncontrolled atrial fibrillation is associated with an irregularly irregular pulse. An echocardiogram is useful to detect any existing structural abnormalities such as left atrial enlargement caused by mitral valve disease.

4- ECG of a 45-year-old man with sarcoidosis shows an 'M' pattern in V5 and inverted T waves in I, aVL and V5-V6.

Answer is I: Left bundle-branch block (LBBB) is associated with the 'WILLIAM' pattern, e.g. 'M' pattern in V5. In LBBB, there is conduction of impulse from the right ventricle to the inter-ventricular septum, and then to the anterior and posterior portions of the left ventricle before it finally reaches the left lateral free wall. Delayed left ventricular depolarization is responsible for the ECG findings in LBBB.

5- ECG of a 12-year-old girl shows normal P waves and QRS complexes but shows T-wave inversion in V1.

Answer is K: T inversion is a normal finding in leads V1-V3 in children.

8. Hypertension

- | | |
|-----------------------------|--------------------------|
| A. Coarctation of the aorta | G. Polycystic kidneys |
| B. Conn's syndrome | H. Portal hypertension |
| C. Cushing's syndrome | I. Pregnancy |
| D. Hyperparathyroidism | J. Renal artery stenosis |
| E. Malignant hypertension | K. Systemic sclerosis |
| F. Pheochromocytoma | |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 30-year-old woman presenting with hypertension is found to have hypokalemia and a mild metabolic alkalosis. ☐
2. An anxious 26-year-old woman presents with episodes of chest pain and palpitations precipitated by stress and smoking. Her 24-hour urine shows elevated catechol amines. ☐
3. A 45-year-old woman presents with weight gain, muscle weakness and hirsutism. On examination she is hypertensive and has pedal edema. ☐
4. A 40-year-old man is brought to ER with severe headache. On examination he has papilledema and fundal hemorrhages. His BP is 220/145 mmHg. ☐
5. Hypertension in a 75 year old who is a heavy smoker with widespread peripheralvascular disease. ☐

Answers: B F C E J

- 1- A 30-year-old woman presenting with hypertension is found to have hypokalemia and a mild metabolic alkalosis.

Answer is B: The combination of hypertension, hypokalemia and metabolic alkalosis is suggestive of primary hyperaldosteronism. This is usually caused by Conn's syndrome (unilateral adrenocortical adenoma) or bilateral adrenal hyperplasia. This is a rare cause of secondary hypertension but is more common in young people with hypertension.

- 2- An anxious 26-year-old woman presents with episodes of chest pain and palpitations precipitated by stress and smoking. Her 24-hour urine shows elevated catecholamines.

Answer is F: Pheochromocytoma is a catecholamine-secreting tumor and is very rare. Symptoms, including palpitations, tachycardia, anxiety, and blanching, are non-specific and may be misdiagnosed. A patient may present as a medical emergency with a hypertensive crisis. The ECG usually reveals left ventricular hypertrophy. Rarely, Pheochromocytoma can be inherited in an autosomal dominant fashion as multiple endocrine neoplasias (MEN) type IIa (includes medullary thyroid carcinoma, parathyroid hyperplasia).

- 3- A 45-year-old woman presents with weight gain, muscle weakness and hirsutism. On examination she is hypertensive and has pedal edema.

Answer is C: These are symptoms of chronic glucocorticoid excess. Other symptoms include menstrual irregularities and mood disturbance. Causes of Cushing's syndrome include administration of exogenous steroids, ACTH-secreting pituitary tumors and adrenal adenomas.

- 4- A 40-year-old man is brought to the ER with severe headache. On Examination, he has papilledema and fundal hemorrhages. His BP is 220/145 mmHg.

Answer is E: Malignant hypertension is severe hypertension associated with acute end-organ failure, e.g. encephalopathy, renal failure. By definition there must be grade III-IV hypertensive changes. Treatment involves careful reduction in blood pressure over several days, usually with oral therapy. Care should be taken to avoid precipitous reduction in blood pressure because this may lead to watershed infarction.

- 5- Hypertension in a 75 year old who is a heavy smoker with widespread peripheral vascular disease.

Answer is J: Renal disease is the most common cause of secondary hypertension. Intrinsic renal disease, e.g. glomerulonephritis, makes up most of these cases. Renal artery stenosis is responsible for around 25 per cent of all cases of renal hypertension. Treatment is directed at reducing blood pressure and preserving renal function. Revascularization may be performed but there is no consensus as to which patients may benefit from this therapy when compared to medical treatment.

9. Treatment of heart failure

- | | |
|---------------------------------------|--|
| A. 100% O ₂ | G. Metolazone |
| B. Digoxin | H. Nifedipine |
| C. Intravenous adenosine | I. Oral furosemide |
| D. Intravenous furosemide. | J. Spironolactone |
| E. Intravenous Isosorbide mononitrate | K. Start cardiopulmonary resuscitation (CPR) |
| F. Lidocaine (lignocaine) | |

For each clinical scenario below, give the most likely cause for the clinical findings. Each option may be used only once.

1. A 65-year-old man with heart failure requires rate control to treat coexisting atrial fibrillation. ☐
2. A 65-year-old woman being treated with large doses of loop diuretic requires add-on therapy for edema refractory to treatment. ☐
3. A 69-year-old woman with asthma being treated with a loop diuretic, ACE inhibitor and long-acting nitrate is prescribed a drug to reduce long-term mortality. ☐
4. A 70-year-old woman with a history of chronic heart failure presents with severe pulmonary edema. ☐
5. Treatment of mild symptoms of shortness of breath and ankle edema in a 65-year-old man with left ventricular dysfunction caused by ischemic heart disease. He is already taking an ACE inhibitor. ☐

Answers: B G J D I

- 1- A 65-year-old man with heart failure requires rate control to treat coexisting atrial fibrillation.

Answer is B: Digoxin has a narrow therapeutic window and toxicity with normal doses can be precipitated by hypokalemia, hypomagnesaemia, renal impairment and hypercalcemia. Signs of digoxin toxicity include confusion, nausea, arrhythmias and visual disturbance.

- 2- A 65-year-old woman being treated with large doses of loop diuretic requires add-on therapy for edema refractory to treatment.

Answer is G: Thiazides may be added to loop diuretics in resistant edema because they have a synergistic mechanism of action. Metolazone is often the drug of choice because it remains effective even in the presence of significant renal impairment.

- 3- A 69-year-old woman with asthma being treated with a loop diuretic, ACE inhibitor and long-acting nitrate is prescribed a drug to reduce long-term mortality.

Answer is J: Spironolactone was shown to decrease long-term mortality when added to conventional therapy.

- 4- A 70-year-old woman with a history of chronic heart failure presents with severe pulmonary edema.

Answer is D: Acute pulmonary edema is a life-threatening medical emergency and the diuretic should be given parenterally. Elderly patients may suffer from COPD/asthma or have a coexisting chest infection and should therefore be given antibiotics and nebulized bronchodilators are required.

- 5- Treatment of mild symptoms of shortness of breath and ankle edema in a 65-year-old man with left ventricular dysfunction caused by ischemic heart disease. He is already taking an ACE inhibitor.

Answer is I: Patients with mild left ventricular dysfunction may be satisfactorily controlled on an ACE inhibitor. If, however, shortness of breath and ankle edema are not sufficiently controlled, oral diuretics are added. The drug of choice is a loop diuretic.

10. Clinical features of cardiac arrhythmias

- | | |
|---|------------------------------|
| A. Atrial ectopics | G. Sinus bradycardia |
| B. Atrial fibrillation | H. Sinus tachycardia |
| C. First- degree heart block | I. Third- degree heart block |
| D. Hemorrhage | J. Ventricular ectopics |
| E. Second- degree heart block (Mobitz type 1) | K. Ventricular fibrillation |
| F. Second- degree heart block (Mobitz type 2) | L. Ventricular tachycardia |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 35- year- old motorcyclist is brought to ER by ambulance following a road traffic accident. He has an impaired level of consciousness and his blood pressure is 85/45 mmHg, while his pulse is 125 bpm, regular rhythm.
2. A 68- year- old man is admitted to CCU following an inferior myocardial infarction. His pulse is 40 bpm, regular rhythm.
3. A 24- year- old athlete attends a routine medical insurance health assessment. His resting pulse is 48 bpm with a regular rhythm and his blood pressure is 105/70 mmHg.
4. A 69- year- old diabetic man is found to have an irregular pulse with a rate of 110 bpm during his diabetic review. He admits to occasional palpitations.

Answers: D I G B

1. A 35-year-old motorcyclist is brought to ER by ambulance following a road traffic accident. He has an impaired level of consciousness and his blood pressure is 85/45 mmHg, while his pulse is 125 bpm, regular rhythm.
D: Hemorrhage typically results in reflex tachycardia prior to hypotension.
2. A 68-year-old man is admitted to CCU following an inferior myocardial infarction. His pulse is 40 bpm, regular rhythm.
I: The most common cause of third-degree heart block is coronary ischemia, typically affecting the inferior region.
3. A 24-year-old athlete attends a routine medical insurance health assessment. His resting pulse is 48 bpm with a regular rhythm and his blood pressure is 105/70 mmHg.
G: Sinus bradycardia is common among athletes and requires no medical input.
4. A 69-year-old diabetic man is found to have an irregular pulse with a rate of 110 bpm during his diabetic review. He admits to occasional palpitations.
B: Irregular pulse should always raise suspicion of atrial fibrillation. Atrial fibrillation is more common among diabetics (by up to 40%), perhaps because they attend more regular clinical assessments, raising the possibility of early diagnosis and management, rather than any particular pathology related to diabetes. Current research may highlight an underlying possible mechanism.

11. Treatment of arrhythmias

- | | |
|-------------------------------------|---------------------------------------|
| A. Digoxin and warfarin for a month | F. Low-molecular-weight heparin (LMW) |
| B. Direct current (DC) shock | G. Oral amiodarone & warfarin |
| C. Intravenous adenosine | H. Oral lidocaine (lignocaine) |
| D. Intravenous amiodarone | I. Oral Sotalol |
| E. Intravenous magnesium | J. Oral warfarin |

For each clinical scenario below, give the most likely cause for the clinical findings. Each option may be used only once.

1. Treatment of a 65-year-old man with atrial fibrillation (AF) of longer than 48 h before DC cardioversion.

2. Initial therapy in a 60-year-old woman presenting with severely compromised acute persistent AF.

3. A 55-year-old man admitted with an acute myocardial infarction develops a short run of ventricular tachycardia (VT). He requires treatment for prophylaxis against recurrent VT.

4. Drug to aid diagnosis in a 50-year-old man presenting with an unidentifiable, regular, narrow-complex tachycardia.

5. Prophylaxis of ventricular tachycardia in a patient with varying QRS axis and prolonged Q-T interval.

Answers: A B D C E

- 1- Treatment of a 65-year-old man with AF of longer than 48 h before DC cardioversion.

Answer is A: A patient with AF of longer than 48 h duration is at risk of thromboembolism after cardioversion. Unless the patient is severely compromised, it is standard practice to anti-coagulate the patient with warfarin for a month before attempting elective cardioversion. During that time the ventricular rate is controlled by prescribing digoxin.

- 2- Initial therapy in a 60-year-old woman presenting severely compromised with acute persistent AF.

Answer is B: In this case immediate DC shock is indicated because the patient is severely compromised. The administration of heparin decreases but does not abolish the risk of thromboembolism after cardioversion.

- 3- A 55-year-old man admitted with an acute myocardial infarction develops a short run of VT. He requires treatment for prophylaxis against recurrent VT.

Answer is D: Amiodarone has class I, II, III and IV actions but is used clinically for its class III actions. Class III drugs prolong the plateau phase of the cardiac action potential and increase the absolute refractory period. As a consequence they also prolong the Q-T interval. Amiodarone is the drug of choice to treat VT. When it is used chronically it has a number of adverse effects but these are not an issue in the acute scenario. These adverse effects include bradycardia, pulmonary fibrosis, hepatic fibrosis, corneal micro deposits (regress if drug is stopped), photosensitive rash and thyroid dysfunction.

- 4- Drug to aid diagnosis in a 50-year-old man presenting with an unidentifiable, regular, narrow-complex tachycardia.

Answer is C: Adenosine causes profound short-term AV block. In this way it can be used to terminate tachycardia involving an AV re-entry circuit. It may also be used in the diagnosis of an unidentified arrhythmia. Adenosine can cause bronchoconstriction and stimulates nociceptive afferent neurons in the heart. The patient should be warned in advance that he may experience symptoms of chest pain after the drug is administered.

- 5- Prophylaxis of ventricular tachycardia in a patient with varying QRS axis and prolonged Q-T interval.

Answer is E: This is torsade de points, which will often degenerate to ventricular fibrillation leading to cardiac arrest. Causes include drugs, electrolyte disturbance and congenital long Q-T syndrome. Conventional anti-arrhythmic will make this condition worse. The treatment of choice is intravenous magnesium sulphate and ventricular pacing at a high rate.

12. Cardiovascular emergencies

- | | |
|---------------------------------|-----------------------------|
| A. 100 % O ₂ | G. DC shock and atropine |
| B. Aspirin, Glyceryl trinitrate | H. Emergency renal dialysis |
| C. Aspirin, heparin | I. Nifedipine |
| D. Aspirin, streptokinase | J. Oral dobutamine |
| E. Atropine | K. Sodium Nitroprusside |
| F. DC shock and adrenaline | L. Subcutaneous LMW heparin |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 57-year-old businessman presents with a 4-h history of crushing chest pain. The ECG changes include ST elevation in II, III and aVF. ☐
2. A 65-year-old man presenting with chest pain becomes unresponsive. His ECG shows ventricular fibrillation. ☐
3. A 40-year-old woman collapses after a flight with breathlessness and right-sided pleuritic chest pain. ☐
4. A 45-year-old man with chronic glomerulonephritis presents with a severe headache. On examination he has papilledema and bilateral retinal hemorrhages. His BP is 240/130 mmHg. ☐
5. A 55-year-old man requires immediate pharmacological management for severe symptomatic sinus bradycardia. ☐

Answers: D F A K E

1- A 57-year-old businessman presents with a 4-h history of crushing chest pain. The ECG changes include ST elevation in II, III and aVF.

Answer is D: This is the presentation of an inferior myocardial infarction and thrombolysis is indicated. Streptokinase is effective in reducing mortality when it is given early, ideally within a few hours of the onset of the chest pain. Contraindications for thrombolysis include any form of internal bleeding, pregnancy, recent head trauma, cerebral malignancy, acute pancreatitis, recent hemorrhagic stroke and esophageal varices. In these cases urgent primary angioplasty may be deemed a viable alternative.

2- A 65-year-old man presenting with chest pain becomes unresponsive. His ECG shows ventricular fibrillation.

Answer is F: DC shock is indicated according to current ACLS (Advanced Cardiac Life Support) guidelines, which emphasize the importance of early defibrillation. Defibrillation should not be delayed to give adrenaline, which should be administered if three shocks (200 J, 200 J, and 360 J) have been unsuccessful / contraindicated.

3- A 40-year-old woman collapses after a flight with breathlessness and right sided pleuritic chest pain.

Answer is A: This is a presentation of pulmonary embolus (PE). Streptokinase has also been used successfully following a major embolism. Open embolectomy is indicated following a massive PE if thrombolysis is unsuccessful or contraindicated.

4- A 45-year-old man with chronic glomerulonephritis presents with a severe headache. On examination, he has papilledema and bilateral retinal hemorrhages. His BP is 240/132 mmHg.

Answer is K: This is the presentation of malignant hypertension. The therapeutic aim should be rapid, but gradual and controllable reduction in blood pressure is the ideal. Both oral and parenteral therapy may be used depending on the clinician's preference. Sublingual nifedipine is contraindicated because it may produce a profound uncontrollable reduction in the blood pressure which may compromise cerebral perfusion.

5- A 55-year-old man requires immediate pharmacological management for severe symptomatic sinus bradycardia.

Answer is E: Atropine is the drug of choice. It is a muscarinic acetylcholine receptor antagonist and thus increases the heart rate by inhibiting vagal tone of the heart. If the patient does not respond to atropinization, cardiac pacing should be instituted

13. Causes of Syncope

- | | |
|--------------------------|-------------------------------|
| A. Anxiety | G. Munchausen syndrome |
| B. Carotid sinus syncope | H. Orthostatic hypotension |
| C. Epilepsy | I. Stokes-Adams attack |
| D. Hypoglycaemia | J. Transient ischaemic attack |
| E. Meniere's disease | K. Vasovagal syncope |
| F. Micturition syncope | |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 76- year- old man fell to the floor while standing in a long queue. He regained consciousness within 2 minutes. He was not incontinent of urine or stools. ☐
2. A 29- year- old secretary had a blackout while working on the computer. She was drowsy for 24 hours after the episode. ☐
3. A 79- year- old woman fell to the floor as she tried to get up from bed. She had recently been started on an angiotensin- converting enzyme (ACE) inhibitor for hypertension. ☐
4. A 55- year- old diabetic collapsed on a long flight. On examination there was pallor and tachycardia. ☐
5. A 71- year- old woman presents with hemiparesis and diplopia which resolved within 24 hours. ☐

Answers: K C H D J

1. A 76- year- old man fell to the floor while standing in a long queue. He regained consciousness within 2 minutes. He was not incontinent of urine or stools.

Answer is K: Vasovagal syncope may present for the first time at any age. It often occurs when upright, though can occur when sitting. It rarely occurs when lying down. There are often no precipitating circumstances, but attacks are more likely to occur in certain situations, e.g. during a large meal in a warm restaurant, when watching a production in a hot theatre, when flying or after prolonged standing.

2. A 29- year- old secretary had a blackout while working on the computer. She was drowsy for 24 hours after the episode.

Answer is C: Prolonged drowsiness after loss of consciousness points to epilepsy.

3. A 79- year- old woman fell to the floor as she tried to get up from bed. She had recently been started on an angiotensin- converting enzyme (ACE) inhibitor for hypertension.

Answer is H: Orthostatic hypotension (postural hypotension) is a form of hypotension in which a person's blood pressure suddenly falls when the person stands up. The decrease is typically greater than 20/10 mmHg, and may be most pronounced after resting. The incidence increases with age.

4. A 55- year- old diabetic collapsed on a long flight. On examination there was pallor and tachycardia.

Answer is D: Long flights can be problematic in insulin- dependent diabetic patients in view of time zone changes, which can result in inaccurate insulin doses leading to hypoglycaemia or hyperglycemia.

5. A 71- year- old woman presents with hemiparesis and diplopia which resolved within 24 hours.

Answer is J: TIA is a change in the blood supply to a particular area of the brain, resulting in brief neurologic dysfunction that persists, by definition, for less than 24 hours. If symptoms persist longer, then it is categorized as a stroke.

Short Heading Questions (SHQs)

- 1) **Pericardial rub is best audible in all except:**

- A. By pressing the chest piece of stethoscope.
- B. After holding the breath.
- C. On the left side of lower sternum.
- D. In lying down position
- E. None of above

- 2) **Slow rising pulse is a feature of:**

- A. Endotoxin shock.
- B. AS.
- C. MS.
- D. Constrictive pericarditis
- E. Coarctation of aorta

- 3) **Pulsus alternans is produced by:**

- A. Pericardial effusion.
- B. Left-sided heart failure.
- C. Chronic obstructive airway disease.
- D. Pulmonary thromboembolism
- E. Extrasystoles every other beat.

- 4) **Central cyanosis is not found in:**

- A. Acute pulmonary edema.
- B. Fallot's tetralogy
- C. Left-to-right shunt.
- D. Transposition of great vessels.
- E. Patent ducts arteriosus

- 5) **Which is not a cause of sinus bradycardia?**

- A. Myxedema.
- B. Complete heart block.
- C. Hypothermia.
- D. Obstructive jaundice.
- E. Increased intracranial tension

- 6) **Regarding neck venous pulsation which is false:**

- A. Undulating.
- B. Better felt than seen.
- C. Becomes prominent on lying down.
- D. There are two negative waves.
- E. Emptying during systole

- 7) Water-hammer pulse is present when pulse pressure is at least above:
- 30 mm Hg.
 - 80 mm Hg.
 - 40 mm Hg.
 - 60 mm Hg.
 - 10 mmHg
- 8) Left parasternal heave is diagnostic of:
- Left ventricular hypertrophy.
 - Right atrial hypertrophy.
 - Right ventricular hypertrophy.
 - Hypertrophic cardiomyopathy.
 - Tricuspid stenosis
- 9) Pulsus bisferiens is found in:
- Combined AS and AI.
 - Combined MS and AS.
 - Combined AI and MI.
 - Combined MS and MI
 - Combined MS and AI.
- 10) v-wave in JVP becomes prominent in:
- Tricuspid incompetence.
 - Cardiac tamponade.
 - Ventricular tachycardia.
 - Right atrial myxoma
 - Complete heart block
- 11) Which is false regarding edema in congestive cardiac failure:
- Initially noticed in the morning.
 - Starts in the dependent part.
 - Pitting edema.
 - Sacral edema in non-ambulatory patients.
 - Is characterized by reduced sodium excretion.
- 12) Which does not produce regularly irregular pulse:
- 2nd degree heart block.
 - Atrial fibrillation.
 - Extrasystoles.
 - Sinus arrhythmia.
 - Atrial tachycardia with block.
- 13) Sudden death may occur in:
- AS.
 - ASD.
 - Constrictive pericarditis.
 - PDA
 - Floppy mitral valve.

- 14) RBBB with left axis deviation in ECG is characteristically seen in:
- VSD.
 - Ostium premium ASD.
 - PDA.
 - Fallot's tetralogy.
 - Ostium secundum ASD
- 15) All of the following produce systemic hypertension except:
- Polycystic kidney disease.
 - Pheochromocytoma.
 - Addison's disease.
 - Conn's syndrome.
 - Unilateral renal artery stenosis
- 16) Classical JVP finding in cardiac tamponade is:
- Prominent a-wave.
 - Prominent x-descent.
 - Prominent y-descent.
 - Small v-wave.
 - Kussmaul's sign
- 17) All are bedside differential diagnosis of MS except:
- Carey Coombs murmur.
 - Left atrial myxoma.
 - Austin Flint murmur.
 - Mitral valve prolapse syndrome.
 - Chronic MR
- 18) The least common complication of MS is:
- Cerebral thrombosis.
 - Sub-acute bacterial endocarditis.
 - Pulmonary hypertension.
 - Atrial fibrillation.
 - Hemoptysis
- 19) Hemoptysis may be found in
- Left ventricular failure.
 - Right ventricular failure.
 - Pulmonary stenosis.
 - Left-to-right shunt
 - Marfan's syndrome.
- 20) Which chamber of heart fails first in MS:
- Right atrium.
 - Right ventricle.
 - Left atrium.
 - Left ventricle.
 - Biventricular

21) In critical MS, the mitral valve orifice is:

- A. $< 6 \text{ cm}^2$.
- B. $< 4 \text{ cm}^2$.
- C. $< 2 \text{ cm}^2$.
- D. $< 1 \text{ cm}^2$.
- E. $< 3 \text{ cm}^2$.

22) Hill's sign is diagnostic of:

- A. AI.
- B. MS.
- C. AS.
- D. MI.
- E. PI.

23) Which of the following gives rise to heaving apex beat:

- A. MS.
- B. MI.
- C. AS.
- D. AI.
- E. HOCM

24) Which of the following does not lead to Eisenmenger's syndrome:

- A. Coarctation of aorta.
- B. PDA.
- C. ASD.
- D. VSD.
- E. Transposition of great vessels

25) Seagull murmur is not a feature of:

- A. Acute myocardial infarction.
- B. Acute rheumatic fever.
- C. Sub-acute bacterial endocarditis.
- D. Floppy mitral valve.
- E. Prosthetic valve endocarditis

26) Which is not an etiology of MI:

- A. Pseudoxanthoma elasticum.
- B. Osteoarthritis
- C. Osteogenesis imperfecta.
- D. Ehlers-Danlos syndrome
- E. Endocardial cushion defect.

27) Commonest organism producing acute bacterial endocarditis is:

- A. Streptococcus viridians.
- B. Staphylococcus aureus.
- C. Streptococcus faecalis.
- D. Pneumococcus
- E. H influenza.

28) Which is not included in 'minor manifestation' of Jones criteria in rheumatic fever?

- A. Prolonged PR interval.
- B. Arthralgia.
- C. Increased ESR.
- D. Elevated ASO titer.
- E. Previous attack of rheumatic fever

29) Which is not a major manifestation' of Jones criteria in rheumatic fever:

- A. Chorea.
- B. Erythema nodosum.
- C. Subcutaneous nodule.
- D. Polyarthrititis.
- E. Erythema marginatum

30) Diastolic shock' in not found in:

- A. Chronic cor pulmonale.
- B. PS.
- C. MS.
- D. VSD.
- E. Systemic sclerosis

31) Incidence of infective endocarditis is least in:

- A. MI.
- B. PDA.
- C. ASD.
- D. VSD.
- E. AS

32) Sudden death may occur in all of the following except:

- A. Atrial fibrillation.
- B. Massive myocardial infarction.
- C. Ventricular fibrillation.
- D. Massive pulmonary thromboembolism.
- E. Long Q-T interval syndrome

33) Carey Coombs murmur is found in:

- A. Pulmonary hypertension.
- B. AI.
- C. Acute rheumatic fever.
- D. MS
- E. Atrial myxoma.

34) Which is not advocated in the treatment of acute pulmonary edema:

- A. Diuretics.
- B. Trendelenburg position.
- C. Morphine.
- D. Rotating tourniquets
- E. Vasodilators

35) Digitalis toxicity is precipitated by all except:

- A. Old age.
- B. Hypokalemia.
- C. Renal failure.
- D. Hepatic encephalopathy.
- E. Quinidine

36) Cannon wave in the neck vein is seen in:

- A. Complete heart block.
- B. Constrictive pericarditis.
- C. Tricuspid incompetence.
- D. Right atrial myxoma.
- E. Pulmonary hypertension

37) Left ventricular hypertrophy is not associated with:

- A. AS.
- B. AI.
- C. MS.
- D. MI.
- E. VSD.

38) Which is not found in constrictive pericarditis:

- A. Pulmonary edema.
- B. Raised JVP.
- C. Ascites.
- D. Pulsus paradoxus.
- E. Pericardial knock.

39) Paroxysmal hypertension is classically found in:

- A. Coarctation of aorta.
- B. Eclampsia.
- C. Renal artery stenosis.
- D. Pheochromocytoma.
- E. Autonomic neuropathy.

40) Cardiac arrest may be due to:

- A. Multiple ectopies.
- B. Atrial flutter.
- C. Pulseless ventricular tachycardia.
- D. Wenckebach block.
- E. Sinus bradycardia.

41) Diagnosis of AMI within 6 hrs depends on:

- A. CPK MB₂/ CPK MB₁ > 1.5.
- B. Increased LDH3
- C. Rise of SGPT > 250 IU/L.
- D. Inverted T wave in ECG
- E. GT

42) Retrosternal chest pain classically occurs in all except:

- A. Acute mediastinitis.
- B. Dissecting aneurysm.
- C. Bornholm disease.
- D. Unstable angina.
- E. Esophageal spasm.

43) CPK-MB is increased in all except:

- A. Myocarditis.
- B. Rhabdomyolysis.
- C. Post-AMI.
- D. Post-electrical cardioversion.
- E. Unstable angina.

44) Which enzyme rises earliest in AMI:

- A. SGPT.
- B. LDH
- C. SCOT.
- D. CPK.
- E. GT

45) Reversed splitting of S2 is found in:

- A. LBBB.
- B. RBBB.
- C. Left ventricular pacing.
- D. Aortic regurgitation.
- E. ASD

46) All of the following drugs may be used in congestive cardiac failure except:

- A. Spironolactone
- B. Carvedilol
- C. Propranolol
- D. Digoxin
- E. Captopril

47) Treatment by heparin is best monitored by:

- A. Prothrombin time (PT).
- B. Clotting time (CT).
- C. Activated partial thromboplastin time (APTT).
- D. Fibrin degradation product (FDP).
- E. D-dimer.

48) All of the following may produce hemiplegia by cerebral embolism except:

- A. Mitral valve prolapse
- B. Atrial fibrillation
- C. Sub-acute bacterial endocarditis
- D. Right atrial myxoma.
- E. Hemiplegic migraine.

49) Drug of choice in acute management of PSVT is:

- A. Amiodarone
- B. Verapamil
- C. Metoprolol
- D. Adenosine
- E. Disopyramide

50) Propranolol can be used in all except:

- A. Systemic hypertension.
- B. Congestive cardiac failure.
- C. Angina pectoris.
- D. Supraventricular tachyarrhythmias.
- E. Hypertrophic cardiomyopathy.

51) Heart valve commonly affected in IV drug abusers is:

- A. Pulmonary valve.
- B. Mitral valve.
- C. Tricuspid valve.
- D. Aortic valve.
- E. Left sided valves.

52) Ventricular fibrillation is best treated by:

- A. IV amiodarone.
- B. Carotid massage.
- C. Electrical cardioversion.
- D. IV lignocaine.
- E. IV β -blocker.

53) P-wave in ECG is absent in:

- A. Atrial fibrillation
- B. Atrial flutter.
- C. Hypokalemia
- D. Paroxysmal supraventricular tachycardia
- E. Nodal rhythm.

54) Verapamil is indicated in all except:

- A. Atrial fibrillation
- B. Acute left ventricular failure
- C. Supraventricular tachycardia
- D. Angina pectoris
- E. Migraine prophylaxis.

55) Hyperthyroid heart disease is manifested by:

- A. Pericardial effusion
- B. Diminished cardiac output
- C. Prolonged circulation time
- D. Paroxysmal atrial fibrillation
- E. Diastolic hypertension.

56) Which of the following is present in most of the patients of SBE:

- A. Murmur
- B. Osler's node
- C. Clubbing
- D. Splenomegaly
- E. Kussmaul's sign

57) Graham Steel murmur is found in:

- A. Severe pulmonary hypertension
- B. Sub-acute bacterial endocarditis
- C. Idiopathic hypertrophic sub aortic stenosis (IHSS)
- D. Tricuspid atresia
- E. Ankylosing spondylitis

58) Commonest heart valve abnormality revealed after AMI is:

- A. AI
- B. MI
- C. AS
- D. MS
- E. Epstein's anomaly

59) Pregnancy-associated hypertension should not be treated with:

- A. Labetalol
- B. Valsartan
- C. α -methyldopa
- D. Amlodipine
- E. Hydralazine

60) Accelerated hypertension should not have:

- A. Retinal hemorrhage
- B. Arterio-venous nipping
- C. 'Silver-wire' arteries
- D. Papilledema
- E. Loud first heart sound

61) Clinically, commonest type of shock is:

- A. Neurogenic
- B. Cardiogenic
- C. Septic
- D. Hypovolemic
- E. Anaphylactic shock

62) JVP is usually increased in:

- A. Cardiogenic shock
- B. Hypovolemic shock
- C. Anaphylactic shock
- D. Septic shock
- E. Addisonian crisis

Answer key:

- | | |
|------|------|
| 1. D | 32.A |
| 2. B | 33.C |
| 3. B | 34.B |
| 4. C | 35.D |
| 5. B | 36.A |
| 6. B | 37.C |
| 7. D | 38.A |
| 8. C | 39.D |
| 9. A | 40.C |
| 10.A | 41.A |
| 11.A | 42.C |
| 12.B | 43.B |
| 13.A | 44.D |
| 14.B | 45.A |
| 15.C | 46.C |
| 16.B | 47.C |
| 17.D | 48.D |
| 18.B | 49.D |
| 19.A | 50.B |
| 20.C | 51.C |
| 21.D | 52.C |
| 22.A | 53.A |
| 23.C | 54.B |
| 24.A | 55.D |
| 25.D | 56.A |
| 26.B | 57.A |
| 27.A | 58.B |
| 28.D | 59.B |
| 29.B | 60.D |
| 30.B | 61.D |
| 31.C | 62.A |

CHEST

Multiple Choice Questions (MCQs)

1. A 32-year-old woman presented with mild fever and fatigue for the past month. She has no significant past medical history. Her temperature is 38.1°C, blood pressure is 115/70 mm Hg, pulse is 75/min, and respirations are 18/min. Non tender, mobile, cervical and axillary lymph nodes are noted. Auscultation of the lungs reveals fine crackles bilaterally. Chest x-ray film showed hilar lymphadenopathy and diffuse interstitial infiltrates. Lymph node biopsy shows non caseating granulomas. **Which of the following is the most appropriate therapy?**

- A. ACE inhibitor
- B. Allopurinol
- C. Cyclosporine
- D. Glucocorticoids
- E. Isoniazid

The correct answer is D. This patient has pulmonary sarcoidosis. The peak age group for sarcoidosis is 20-40 years, and the disease seems to be more common in blacks. Non caseating granulomas can occur in the lungs, heart, kidneys, skin, liver, or other organs. Most characteristically, the patients are asymptomatic, and the disease is detected by an abnormal chest x-ray film, which usually shows bilateral symmetric hilar adenopathy often associated with paratracheal adenopathy and/or parenchymal infiltrates. Patients may have uveitis, peripheral arthritis, skin involvement with granulomas, or erythema nodosum. The lungs are the most frequently involved organ; pulmonary symptoms, when present, include dyspnea on exertion, nonproductive cough, and wheezing. Many patients show spontaneous total remission of disease for a period up to 3 years. Prednisone is usually the drug of choice for treatment, with a starting dose of 30-40 mg/day.

Neither allopurinol nor cyclosporine has been proven to be of benefit in sarcoidosis. Levels of ACE may be elevated in patients with sarcoidosis but are also elevated in many other diseases. This enzyme elevation is thought to be related to induction by the granulomas. There is no evidence that ACE inhibitors have any therapeutic value in treatment of sarcoidosis. Furthermore, isoniazid has not been shown to be beneficial.

2. A 39-year-old man presents to the ER with acute onset of shortness of breath, hemoptysis, and left-sided pleuritic chest pain. His past medical history includes medication-controlled asthma, peptic ulcer disease, and a recent onset of idiopathic nephrotic syndrome. His blood pressure is 180/100 mm Hg, pulse is 110/min, and RR is 28/min. Cardiac and lung examinations are normal. Laboratory data are remarkable for a serum lactate dehydrogenase of 300 U/L. An ECG shows sinus tachycardia, prominent S waves in lead I, inversions of the T wave, and a prominent Q wave in lead III. **Which of the following is the most likely cause of the chest pain?**

- A. Aortic dissection
- B. Esophageal spasm
- C. Myocardial infarction
- D. Pneumonia
- E. Pulmonary embolism

The correct answer is E. Clinical features suggestive of pulmonary embolism in this patient are pleuritic chest pain, hemoptysis, tachycardia, tachypnea, and elevated serum lactate dehydrogenase (suggestive of lung infarction). Individuals with nephrotic syndrome are at increased risk of pulmonary embolism because of an underlying hypercoagulable state. Possible mechanisms responsible for the underlying hypercoagulability include loss of anticoagulant proteins in the urine and intravascular volume depletion. The ECG findings are indicative of acute cor pulmonale, which may mimic inferior myocardial infarction (MI); however, an inferior wall MI is characterized by prominent Q waves and ST segment elevations in leads I, II, and AVF.

3. A 43-year-old woman complains of slowly increasing breathlessness. She has no smoking history. Investigations reveal she has bilateral enlarged hilar lymph nodes, elevated serum calcium, interstitial lung disease, and enlarged liver and spleen. **What is the most likely diagnosis?**

- A. Coccidioidomycosis
- B. Hyperparathyroidism
- C. Hypervitaminosis D
- D. Sarcoidosis
- E. Tuberculosis

The correct answer is D. Sub-acute increasing breathlessness suggests the diagnosis of sarcoidosis, and elevated calcium narrows the differential diagnosis further. Hyperparathyroidism would not cause symptoms of breathlessness. Coccidioidomycosis is a fungal infection caused by inhalation of the spores of *Coccidioides immitis*. It usually presents with fever, cough myalgia and rash. TB is the major differential diagnosis in this case. Hypercalcemia and BHL however are in favor of a diagnosis of Sarcoidosis.

4. A 65-year-old woman used to smoke 50 cigarettes a day for 40 years. She had increasing dyspnea for several years, but no cough. Chest X-ray shows increased lung size along with flattening of the diaphragms. Over the next several years she developed worsening peripheral edema. Her vital signs show T 36.7°C, Pulse 80/min, RR 15/min, and BP 120/80 mm Hg. **Which of the following cardiac findings is most likely to be present?**

- A. Constrictive pericarditis
- B. Left ventricular aneurysm
- C. Mitral valve stenosis
- D. Non-bacterial thrombotic endocarditis
- E. Right ventricular hypertrophy

The correct answer is E. The most likely finding in this woman is pulmonary hypertension as a result of emphysema secondary to long term cigarette smoking. Peripheral edema is due to right heart dilatation and failure. Mitral stenosis is not supported by the history. Constrictive pericarditis would be characterized by soft heart sounds, a diastolic "pericardial knock", and gross signs of right heart failure. LV aneurysm would lead to symptoms and signs of left heart failure and again is not the most likely finding suggested by the history.

5. A 38-year-old male presents with episodic wheeze and non-productive cough which occurs particularly at night. He has been employed in the plastics industry. He is worried about relation of these symptoms to his work. Which of the following confirms his worries?

A. Absent family history of asthma.
 B. Commencement of symptoms on his first day of work
 C. Elevated serum IgE concentration
 D. Improved symptomatology when being on holiday
 E. Increased bronchial reactivity

The correct answer is D. Episodic cough and wheeze with nocturnal symptoms are classical of asthma. Occupational asthma is the commonest industrial lung disease with over 400 causes and accounts for up to 10% of adult onset asthma. The commonest occupations affected are spray painters, bakers, Chemical processors, plastics workers and welders and soldering. Patients are characteristically better when on holiday. The diagnosis is confirmed by serial PEF measurements at home and at work. Recordings should be performed 2 hourly for 4 weeks or if this is not possible methacholine/histamine challenges can be undertaken after days at work and away from work. Following objective confirmation of the diagnosis the underlying cause should be identified.

6. A 55-year-old plumber presented with a dry nocturnal cough and increasing exertional breathlessness. On examination he had early finger clubbing, cyanosis and bilateral basal crackles. A chest X-ray showed bilateral lower zone shadowing. Investigations revealed:

PaO₂ (breathing air) 8.2 kPa (11.3 – 12.6)
 FEV1/FVC ratio 85%

Which of the following investigations is most likely to establish the diagnosis?

A. Echocardiography.
 B. High resolution CT scan of chest
 C. Measurement of diffusion capacity
 D. Serum angiotensin-converting enzyme level
 E. Transbronchial lung biopsy

The correct answer is B. This patient has a restrictive lung defect and hypoxia, with clinical features of lung fibrosis. With the occupational history, there might have been previous asbestos exposure, although the CXR is not reported to show pleural thickening or plaques. The next test should be one to confirm pulmonary fibrosis. High resolution CT chest is often diagnostic with good correlation to histological abnormalities. A ground-glass appearance is associated with predominantly cellular appearance on biopsy and more active disease, which responds to treatment and has a better prognosis. A reticular pattern is suggestive of destroyed fibrotic lungs.

7. A 48-year-old woman presented with shortness of breath, cough with heavy sputum production, and low grade fever. She used to smoke 20 cigarettes per day for 30 years. Her arterial blood gases revealed:
- | | |
|------------------|-------------------|
| PH | 7.4 (7.36 – 7.44) |
| PCO ₂ | 45 mmHg (35–45) |
| PO ₂ | 78 mmHg (90–110) |

What is the most likely diagnosis?

A. Bronchial asthma
 B. Chronic bronchitis
 C. Cryptogenic fibrosing alveolitis
 D. Paraneoplastic syndrome
 E. Pulmonary embolism

The correct answer is B. The most likely explanation based on the symptoms and the relative hypoxia with high PCO₂ is an acute exacerbation of COPD - towards the chronic bronchitis end of the spectrum.

8. A 67-year-old man presents with a long history of cough, breathlessness on minimal exertion and ankle swelling. He smokes 30–40 cigarettes per day. Investigations are as follows:

Hemoglobin	19 g/dl
White blood count	7.3 x 10 ⁹ /L
PaO ₂ (air)	6.2 kPa
PaCO ₂ (air)	8.9 kPa
Serum [H ⁺]	44 nmol/l
Serum [HCO ₃ ⁻]	36 mmol/l

What is the most likely explanation of these results?

A. Acute respiratory acidosis
 B. Chronic respiratory acidosis
 C. Chronic respiratory alkalosis
 D. Metabolic acidosis
 E. Metabolic alkalosis

The correct answer is B. Normal range [H] = 36–44 nmol/l. Normal range [HCO₃] = 21 – 27.5 mmol/l. Even if you did not know the normal reference values for H and HCO₃, you should have been able to make an intelligent guess at compensated respiratory acidosis from the clinical history, type 2 respiratory failure and probable secondary polycythemia.

9. A 55-year-old man who has a 25 year pack history of smoking presents with productive cough with mucoid sputum of 2 years duration. On examination he has scattered rhonchi and wheezing. What is the most likely diagnosis?

- A. Bronchial Asthma
- B. Bronchiectasis
- C. Chronic Bronchitis
- D. Fibrosing Alveolitis
- E. Pneumonitis

Answer C: Chronic bronchitis is one of the most common respiratory diseases due to cigarette smoking. The smoking history and productive cough for at least 2 years is indicative of chronic bronchitis.

10. You are asked to examine a patient who attends ER with shortness of breath. The chest X-ray shows right lower lobe consolidation. Which of the following features should prompt admission to hospital?

- A. A PaO_2 of 9.8 kPa (11-13)
- B. A respiratory rate of 32/min
- C. A SaO_2 of 95%
- D. A White cell count of $16.8 \times 10^9/\text{l}$
- E. Audible Bronchial breathing

The correct answer is B. The British Thoracic Society guidelines for community acquired pneumonia in adults recommend use of the CURB-65. A 6-point score, one point for each of Confusion, Urea $>7 \text{ mmol/l}$, Respiratory rate 30/min or more, systolic Blood pressure below 90mmHg or diastolic below: 60mmHg, Age 65 years or older. If the CURB score is 1-2 then risk of death is increased and hospital admission should be considered. A CURB score of 3 or more puts the patient at high risk of death and hospital admission is warranted.

11. A 75-year-old female presents with an acute infective exacerbation of her long standing Chronic Obstructive Airways Disease. Blood gas analysis whilst she was receiving oxygen shows:

pH	7.14 (7.36-7.44)
PO_2	18 kPa (11.3-12.6)
PCO_2	10.5 kPa (4.7-6.0)

What is the most appropriate immediate management for this patient?

- A. CPAP
- B. Doxapram infusion
- C. Invasive Ventilation
- D. Nebulized salbutamol with ipratropium
- E. Reduce inspired oxygen concentration

The correct answer is E. This patient's blood gases show she is receiving too high a concentration of oxygen which is likely to have precipitated her hypercapnic acidosis. Patients with COPD should not in general receive more than 24-28% oxygen without arterial blood gas monitoring. Reduction of FiO_2 may be sufficient to improve this lady's acidosis. Once this is done she should be treated with nebulized bronchodilator driven on air and if she fails to improve despite controlled oxygen and bronchodilators NIV is indicated.

12. An otherwise healthy 32-year-old man was involved in a high speed accident 3 days ago. He has sustained a closed fracture of his femur which has been treated surgically with an intramedullary nail, as well as fractures of his right clavicle and left radius. On examination, he is acutely short of breath and has a temperature of 37.5°C . The patient seems confused when you speak to him, and as you examine him, you note petechial hemorrhages. What do you think is the most likely diagnosis?

- A. Asthma attack
- B. Chest infection
- C. Fat embolism
- D. Pulmonary embolism
- E. Tension pneumothorax

The correct answer is C. The two diagnoses which should be considered first in this scenario are pulmonary embolism and fat embolism. Although the patient is at high risk of pulmonary embolism, and appropriate measures should be undertaken to reduce this, the clinical scenario is more suggestive of fat embolism. Fat embolism is thought to occur as a result of release of lipid globules from damaged bone marrow fat cells. Another suggested mechanism is the increased mobilization of fatty acids peripherally. The effects that are seen clinically depend on what part of the microvasculature is affected by the lipid globules. Pulmonary symptoms are caused by ventilation perfusion mismatch. Confusion (cerebral effects) may be seen, as well as a petechial rash caused by capillary damage in the skin.

13. A 65-year-old man with known chronic obstructive pulmonary disease, treated with inhalers, was admitted with a six-week history of gradually increasing shortness of breath. He was apyrexial, mildly confused with a respiratory rate of 26 breaths per minute and there were no changes on the chest X-ray. Investigations revealed:

PaO_2	7.8KPa (9-12.6)
PaCO_2	8.5kPa (4.7-6.0)
PH	7.3 (7.36 - 7.44)

What is the most appropriate immediate management?

- A. High flow oxygen therapy
- B. Intravenous aminophylline
- C. Intravenous hydrocortisone
- D. Intubation and mechanical ventilation.
- E. Nebulized salbutamol and ipratropium bromide.

The correct answer is E. The patient normally uses inhalers and therefore is likely to respond to nebulized bronchodilators, which should be nebulized with air and not high flow oxygen. Corticosteroids have been shown to reduce length of stay in hospital, and are usually given in acute exacerbations of COPD. Non-invasive ventilation should be tried first in severe cases before progressing to mechanical ventilation if appropriate. IV aminophylline is recommended as a second to third line therapy of COPD with reversible airways.

14. A 65-year-old obese man presents with night time sweats, nocturia, poor concentration and day time somnolence. **To which of the following conditions does the patient is predisposed?**

A. Hypoglycemia
B. Hypotension
C. Insulin sensitivity
D. Osteoporosis
E. Sudden death

The correct answer is E. This history is typical of sleep apnea. Sleep apnea is an independent risk factor for stroke (and death from all causes), and is associated with hypertension, impaired glucose tolerance, and insulin resistance.

15. A 61-year-old, heavy smoker, with a BMI of 37, presents with impotence, nocturia and depression. He is hypoxic at rest on air and has ankle edema. **Which is the most appropriate investigation to determine the etiology?**

A. Arterial blood gas
B. Chest x-ray
C. Sleep study
D. Thyroid function test
E. Ventilation-perfusion scan

The correct answer is C. The clinical scenario describes cor pulmonale secondary to diurnal respiratory failure. This occurs in patients with severe obstructive sleep apnea (OSA). Most patients who develop this complication have lower airway obstruction (from smoking), gross obesity or respiratory muscle weakness. Hypercapnia out of proportion to the degree of lung disease should suggest OSA as a possible diagnosis.

16. A patient with Rheumatoid arthritis complains of progressive breathlessness. **Which of the following is the most likely cause?**

A. Asthma
B. Fibrosing Alveolitis
C. Pulmonary Embolus
D. Pulmonary Eosinophilia
E. Pulmonary nodules

The correct answer is B. Fibrosing alveolitis associated with rheumatoid arthritis is indistinguishable from cryptogenic fibrosing alveolitis. It presents with progressive breathlessness and cough. Signs include finger clubbing, cyanosis and bilateral end inspiratory crackles. Other pulmonary complications of Rheumatoid arthritis include pleural effusions, empyema, cryptogenic organizing pneumonia, bronchiectasis and pulmonary nodules. The latter are usually asymptomatic but may cavitate resulting in hemoptysis and when occurring with coal workers pneumoconiosis (Caplan's Syndrome) is associated with breathlessness.

17. A 40-year-old male, presents with a long history of productive cough and breathlessness. He had complained of halitosis and exacerbations of productive sputum, chest pain and hemoptysis. Examination revealed bilateral inspiratory crackles. **Which of the following treatments is likely to decrease the frequency of his exacerbations?**

A. Cyclic antibiotic therapy
B. Inhaled corticosteroids
C. Nebulized bronchodilators
D. Postural drainage
E. Surgical resection

The correct answer is D. This man has Bronchiectasis as evidenced by his regular production of sputum associated with breathlessness, his repeated lung infections and the signs of bilateral inspiratory crackles. Retained mucus is the most important reason why bronchiectasis patients become infected. Postural drainage is therefore the cornerstone to treating bronchiectasis and should be undertaken at least once per day and more frequently during exacerbations.

There have been trials looking at regular antibiotic therapy versus symptomatic treatment in patients with cystic fibrosis colonized with pseudomonas but there is currently no evidence that this approach is of benefit in bronchiectasis. Similarly inhaled corticosteroids should not be used routinely in bronchiectasis until further evidence of their effect on lung function and exacerbation frequency is available. Surgical resection as a curative procedure can be performed for localized disease when underlying causes such as primary ciliary dyskinesia have been excluded. In this patient the bilateral crackles suggests widespread disease.

18. A 60-year-old woman presents with deteriorating dyspnea and cough productive of purulent sputum. She has a two year history of recurrent chest infections and is a smoker of 5 cigarettes daily. On examination, she appeared breathless with a pulse of 100 bpm and her temperature was 39°C. Investigations revealed:

Hemoglobin	19.5 g/dL
White cell count	$15.7 \times 10^9/L$
Platelets count	$350 \times 10^9/L$
PaO ₂	6.8 kPa (11.3-12.6)
Carboxy-hemoglobin	15.5% (3-15)
Red cell mass	147% (75-125)

What is the most likely explanation for these findings?

- A. Chronic obstructive airways disease
- B. Ectopic erythropoietin production
- C. Myelofibrosis
- D. Primary polycythemia
- E. Pseudo-polycythemia

The correct answer is A. This patient has polycythemia which is likely to be secondary to her hypoxia. The cause of the hypoxia is most likely to be due to chronic obstructive pulmonary disease as a result of her heavy smoking history. Her history of increasing breathlessness, cough, sputum production, and recurrent-chest infections is consistent with this diagnosis. Her treatment is to stop smoking and use long term oxygen therapy (LTOT) (i.e. oxygen > 15 hours /day). The indications for LTOT are: $paO_2 < 7.3$ kPa (55 mmHg) or $paO_2 < 8.0$ kPa (60 mmHg) with evidence of pulmonary hypertension, peripheral edema or polycythemia.

19. A 72-year-old lifelong smoker presents with progressive dyspnea on exertion and chronic, nonproductive cough. On examination he is thin, breathing with pursed lips, respiratory rate 25/min, with mild wheezing on chest auscultation. What is the predominant mechanism of the airflow limitation in this gentleman?

- A. Bronchospasm
- B. Foreign body obstruction
- C. Increased airways resistance
- D. Loss of elastic recoil
- E. Mucus plugging in the small airways

The correct answer is D. This patient has typical features of COPD with a predominant emphysematous element. The pathology is centrilobular or panacinar with loss of elastic tissue.

20. A 63 year-old diabetic patient presents with productive cough and shortness of breathe for 5 days. She has right lower lobe consolidation and small unilateral pleural effusion on CXR. Which of the following points to a poor prognosis?

- A. Her age
- B. Her CXR signs
- C. Her diabetes
- D. Temp >38°C
- E. WCC > 15

The correct answer is C. Indicators of poor prognosis in pneumonia include: age >65, co-existing morbidity including diabetes mellitus, chronic renal failure, stroke, coronary artery disease, respiratory rate >30 and mental impairment. Biochemical/hematological markers include white count < 4 or > 30, hypoxia needing CPAP or $FiO_2 > 60\%$, positive blood culture and blood urea > 7mmol.

21. A 20-year-old male student is assessed for shortness of breath that occurs whilst running. He has no other symptoms and does not smoke. Physical examination, full blood count, and chest X-ray are normal. Which of the following is most likely to be helpful in confirming the suspected diagnosis?

- A. Arterial blood gas studies before and after exercise
- B. Determination of lung volumes and diffusing capacity
- C. Measurement of venous blood lactate before and after exercise
- D. Spirometry before and after administration of bronchodilators
- E. Spirometry before and after exercise

The correct answer is E. The most likely diagnosis is exercise-induced asthma and this would be best diagnosed with Spirometry before and after exercise where a typical obstructive pattern may be displayed following exercise. No abnormalities may be displayed following bronchodilator therapy. Similarly lung volumes and diffusion capacity are likely to be unaffected. Blood gas analysis would be relatively unhelpful in this scenario as little change in partial pressures would be expected. This patient does not have any glycogen-storage disease where weakness rather than shortness of breath is more typical. Hence lactate measurements are unnecessary.

22. A 65-year-old woman presented with increasing fatigue, dyspnea and dry cough. Her chest X-ray shows an area of dense pneumonia-like consolidation in the right lower lobe. A course of antibiotics did not improve her symptoms or chest X-ray. Broncho alveolar lavage (BAL) retrieved 'atypical' cells. What is the most likely diagnosis?

- A. Bronchioloalveolar cell carcinoma
- B. Mycoplasma pneumonia
- C. Pulmonary alveolar proteinosis
- D. Pulmonary embolism with infarction
- E. Sarcoidosis

The correct answer is A. "Broncho alveolar carcinoma accounts for between 1-20% of pulmonary neoplasms. The population most affected is middle-aged, with no

predilection for either sex. Interestingly, there is an increased incidence in patients with scleroderma or other diseases causing localized parenchymal scarring or diffuse interstitial fibrosis. Diffuse bilateral involvement in Broncho alveolar cell carcinoma occurs late in the disease and is usually spread by the bronchial tree. Manifestations include both local and diffuse forms. The local form may grow very slowly changing a little for several years. The diffuse form simulates an airspace filling disease with air broncho-grams. A pleural effusion develops in 8-10% of cases.

23. A 25-year-old male presents to ER with shortness of breath. One week ago, he developed influenza and became more short of breath and fatigued in the last 24 hours. His temperature is 38.5°C, his SaO₂ is 90% on 2L of oxygen, blood pressure 100/60 mmHg and heart rate 120/min. The CXR shows patchy consolidation. Which antibiotic therapy should you select for this man?

- A. Amoxicillin
- B. Amoxicillin and Flucloxacillin
- C. Amoxicillin and Gentamicin
- D. Amoxicillin and Rifampicin
- E. Flucloxacillin

The correct answer is B. Patients who present with pneumonia after influenza or measles are at risk of Staphylococcal pneumonia. Look for cavitation on the CXR. The guidelines: state that amoxicillin should be first line therapy for all pneumonia, with the addition of Flucloxacillin if there is risk of it being Staphylococcal. Gentamicin may be indicated in severe hospital acquired pneumonia, and rifampicin in severe atypical infections (e.g. Legionella).

24. A 47-year-old woman presenting with breathlessness has her arterial blood gases taken which give the following results:

PO ₂	8.7 kPa (11.3-12.6)
PCO ₂	4.4 kPa (4.7-6.0)
PH	7.46 (7.36-7.44)
HCO ₃	24 mmol/L (20-28)

Which of the following is most likely the diagnosis?

- A. Acute severe asthma
- B. Emphysema
- C. Hyperventilation syndrome
- D. Kyphoscoliosis
- E. Opiate overdose

The correct answer is A. The patient has an acute respiratory alkalosis with associated hypoxia. This is consistent with an acute asthmatic attack. A normal or rising CO₂ is an ominous sign indicative of a life threatening attack and the need to consider ventilator support. Patients with hyperventilation syndrome do show a respiratory alkalosis but this is not associated with hypoxia.

25. A solitary nodule is detected on a chest x-ray film in an otherwise healthy 55-year-old man. The patient has been smoking 10 cigarettes daily for 3 years. The nodule is located in the right middle lobe and measures approximately 3 cm. Previous chest x-ray films are not available for comparison. CT scan reveals a solitary lung nodule with an irregular contour. No other pulmonary lesions are found. Physical examination and routine laboratory tests are normal. Which of the following is the most likely diagnosis?

- A. Aspergilloma
- B. Bronchogenic carcinoma
- C. Hamartoma
- D. Pulmonary abscess
- E. Secondary (reactivated) tuberculosis

The correct answer is C. This case raises the problem of the clinical approach to a solitary pulmonary nodule radiographically detected in an otherwise healthy subject. In large surveys, 60% of solitary pulmonary nodules are benign, and granulomas represent the most common benign lesion. However, there is no infallible clinical or radiologic set of criteria that can discriminate between benign and malignant lesions. Factors favoring a benign lesion include young age (<40 to 45 years), small size (<2 cm) and smooth margins of the lesion, absence of symptoms, and slow growth on successive films. Generally, calcification is not a malignant feature, and presence of "popcorn-like" calcifications definitely favors hamartoma. A hamartoma is a malformative lesion resulting from random admixture of tissues normally present in the lung, including cartilage, bronchial mucosa, and smooth muscle. It is usually discovered incidentally.

Secondary (reactivated) tuberculosis manifests with multiple nodular and cavitary infiltrates in the upper lobes; the patient has low-grade fever, malaise, weight loss, and cough. However, primary tuberculosis may result in a calcified nodule within the lung parenchyma, which is the remnant of an old Ghon complex.

26. A 45-year-old man with alcoholism is admitted with a diagnosis of acute pancreatitis. He requires large volumes of fluid to maintain blood pressure and urine output, but 24 hours after admission, he appears in stable condition. On the fourth hospital day, the patient develops rapidly progressive respiratory distress, with labored breathing and tachypnea. His temperature is 37.0° C, pulse is 100/min, blood pressure is 130/75 mm Hg, and RR is 24/min. Intercostal retraction and crackles are appreciated on chest examination. Blood tests show:

Arterial blood gas (room air)
pH 7.32
PaO₂ 52 mm Hg
PaCO₂ 51 mm Hg

Hematocrit 42%
Leukocytes 9800/mm³
Glucose 110 mg/dL
BUN 20 mg/dL
AST 98 U/L
ALT 60 U/L
Amylase 280 U/L

A chest x-ray film reveals diffuse bilateral infiltrates, a normal cardiac silhouette, and minimal pleural effusions. Which of the following is the most likely diagnosis?

- A. Acute bilateral bronchopneumonia
- B. Acute respiratory distress syndrome
- C. Cardiogenic pulmonary edema
- D. Exacerbation of acute pancreatitis
- E. Pulmonary embolism

The correct answer is B. The clinical picture is consistent with ARDS, a disorder that may be triggered by a number of different conditions, among which is acute pancreatitis. Typically, ARDS develops 12 to 48 hours following the initiating event (3 to 4 days after acute pancreatitis) and is characterized by acute respiratory failure unresponsive to supplemental oxygen. Therapy includes treatment of the underlying condition and mechanical ventilation with positive end expiratory pressure (PEEP). The overall mortality rate is 50%.

27. A 49-year-old man with acute pancreatitis develops severe shortness of breath 15 minutes after undergoing placement of a catheter in his subclavian vein. His blood pressure is 100/60 mm Hg, pulse is 124/min, and RR is 50/min. He is cyanotic and in obvious distress. His neck veins are distended, and his trachea deviates to the left. Breath sounds are diminished on the right side of his chest. Which of the following is the most appropriate next step in management?

- A. Chest x-ray
- B. Endotracheal intubation
- C. Needle thoracotomy in the second right intercostal space
- D. Removal of the catheter
- E. Tube thoracotomy in the left fifth intercostal space

The correct answer is C. A significant risk associated with catheterization of the subclavian veins is a closed traumatic pneumothorax due to puncture of the apex of the lung. Hypotension, tachycardia, tachypnea, and cyanosis all favor this diagnosis.

Classic clues in the patient's presentation are the distended neck veins, diminished breath sounds on the right side of the chest, and tracheal deviation to the opposite side. The most appropriate immediate treatment is needle thoracotomy at the second right intercostal space followed by chest tube insertion at the right fifth intercostal space. Chest x-ray is not necessary in this patient since the clinical examination was sufficient for making the diagnosis. Waiting for chest x-ray results before treating this unstable patient could prove fatal. Note, however, that chest x-rays are routinely performed after catheterizations to rule out subclinical pneumothorax. On x-ray films, a pneumothorax appears as a region of air without peripheral lung markings limited by a distinct pleural boundary with medial lung markings. Removal of the catheter would not treat the punctured lung. Note that future attempts at central line placement should be attempted on the right side in this patient to avoid the possibility of creating bilateral pneumothorax. Endotracheal intubation would not relieve the pneumothorax and would not be expected to improve respiratory status until the pneumothorax was successfully treated.

Tube thoracotomy in the left fifth intercostal space would be on the wrong side in this patient with a right pneumothorax.

28. A 72-year-old man suffers severe pleuritic chest pain on the seventh postoperative day after surgical pinning of an intertrochanteric hip fracture. He was not on anticoagulants at the time. He is hemodynamically stable, but is short of breath and has distended neck veins. Spiral CT scan shows the presence of a pulmonary infarct on the left side, and echocardiogram does not show signs of right ventricular strain. Which of the following is the most appropriate management at this time?

- A. Anticoagulation with heparin
- B. Infusion of thrombolytic agents into the left pulmonary artery
- C. Insertion of vena cava filter
- D. Surgical embolectomy
- E. Systemic infusion of thrombolytic agents

The correct answer is A. Anticoagulation with heparin is the standard therapeutic first step for pulmonary embolus. Thrombolytic agents still have a very limited role in the treatment of pulmonary embolus. They may be considered when overwhelming right-sided heart failure is life threatening, but bleeding remains a formidable potential complication; therefore, they are contraindicated after major surgery. When they are used, systemic administration is as effective as direct delivery into the pulmonary artery.

Vena cava filters are indicated only when pulmonary emboli recur while under anticoagulation, or if anticoagulation cannot be instituted.

Surgical embolectomy has the same restricted indications noted for the thrombolytic agents, and as a rule it is a major undertaking rarely feasible in a very sick patient.

29. A 48-year-old man with a long history of smoking presents to the ER with difficulty breathing for the past 2 days. His temperature is 38.3°C, blood pressure is 120/70 mm Hg, and pulse is 103/min. Dullness to percussion and decreased breath sounds are noted over the right lower lung field. An upright chest x-ray film reveals a significant right-sided pleural effusion. Decubitus films show layering of the effusion. A diagnostic thoracentesis is performed. The following results are obtained:

Pleural fluid:

pH 7.18, Glucose 40 mg/dL, Protein 3.8 g/dL, and LDH 220 IU/L

Serum:

Protein 7.0 g/dL, LDH 320 IU/L

Which of the following is the most likely etiology of the effusion?

- A. A transudate of infectious etiology
- B. A transudate of noninfectious etiology
- C. An exudate of infectious etiology
- D. An exudate of inflammatory etiology
- E. An exudate of malignant etiology

The correct answer is C. This is an exudative effusion by definition. The pleural fluid LDH to serum LDH ratio is >0.6 , and the pleural fluid protein to serum protein ratio is >0.5 , so choices A and B can be eliminated. Determining whether this is infectious or malignant is tricky in malignant effusions, very rarely is the pleural fluid glucose level less than 60 mg/dL (15%). The sub-acute clinical scenario (2 days of symptoms) and the temperature to 38.5°C generally indicate an infectious etiology. The low pH is seen in both complicated parapneumonic effusions and cancer and does not help in the diagnosis. Further testing, including Gram stain, cultures, and cytology, should be done on this fluid.

30. A 56-year-old man presents with a 10-month history of increasing dyspnea on exertion and occasional dry cough. He has been smoking half a pack of cigarettes daily for 40 years and has a history of rheumatoid arthritis. Chest examination reveals mild hyperresonance in all lung fields and diminished breath sounds. Lung volume measurements show increased total lung capacity (TLC) and residual volume (RV), with an elevated RV/TLC ratio. Which of the following is the most likely diagnosis?

- A. Asthma
- B. Bronchiectasis
- C. Chronic bronchitis
- D. Emphysema
- E. Interstitial lung disease

The correct answer is D. Most cases of emphysema are associated with long exposure to cigarette smoking. Emphysema manifests with progressive respiratory difficulty and a characteristic increase in the anteroposterior diameter of the chest (barrel chest). Hyperresonance and diminished breath sounds are present on chest examination, whereas chest x-ray shows hyperinflation and frequent parenchymal bullae (especially subpleural). The most characteristic changes in pulmonary function tests include increased TLC and RV, with an elevated RV/TLC ratio, which indicates that there is a

predominant expansion of RV at the expense of functioning lung parenchyma.

31. A 36-year-old woman who has worked as a hospital nurse for the past 10 years complains of fatigue, weight loss, cough with blood-tinged sputum, and night sweats for 4 months. She has had evening temperatures up to 38.5°C. Prior to this, she had been in good health. Chest examination is remarkable for bilateral rhonchi and coarse crackles in the upper lung fields. A chest x-ray film reveals bilateral pulmonary infiltrates and cavitary lesions in the upper lobes. Her records show that she became positive to the tuberculin skin test in her first year of work as a nurse but was not treated. Which of the following interventions at that time would most likely have prevented her current condition?

- A. Annual chest x-ray examination
- B. BCG vaccination
- C. Close observation only
- D. Isoniazid for 6 months
- E. Rifampin for 6 months

The correct answer is D. The patient is exhibiting typical symptomatology of active tuberculosis, which preferentially affects the posterior segments of the upper lobes. Isoniazid (300 mg/day) prevents active disease in most individuals who are recent "skin test converters," defined as persons with a prior documented negative tuberculin test within 2 years of a newly positive test. Isoniazid prophylaxis is also recommended for all HIV positive or immunocompromised patients and for close contacts of patients with active tuberculosis.

32. A 74-year-old woman suddenly became delirious 1 hour ago. She was well until 5 days ago, when she tripped and injured her right leg; she has been bedridden since the accident. On examination, her temperature is 37.2°C, blood pressure is 110/70 mm Hg, pulse is 110/min, and respirations are 32/min. Her heart, lungs, and abdomen are normal, and there are no focal motor or sensory deficits. Passive flexion of her right hip causes obvious pain. Pulse oximetry shows an oxygen saturation of 80%, and a chest x-ray is normal. An ECG shows sinus tachycardia. Which of the following is the most likely diagnosis?

- A. Acute cerebral hemorrhage
- B. Acute cerebral infarction
- C. Myocardial infarction
- D. Pulmonary infarction
- E. Pulmonary thromboembolism

The correct answer is E. This patient has classic risk factors for pulmonary thromboembolism (PTE): leg injury and bedridden state. Her tachycardia, tachypnea, decreased O_2 saturation on pulse oximetry, and low-grade fever are also consistent with the diagnosis. The chest x-ray is often normal in cases of PTE, as in this patient. Her presenting symptom, delirium, is most likely due to her hypoxic state. Note that PTE is one of the diagnoses the physician is likely to miss if he or she does not actively think about it; this can be fatal to the patient. Shortness of breath is the most common symptom of PTE, and tachypnea is the most frequent sign. In young patients, the common signs and symptoms (cardiac and respiratory) of PTE may mimic anxiety

especially when other corroborating signs are absent. In older patients whose primary complaint is vague chest discomfort, the symptoms might be confused with those of myocardial infarction (MI), causing the patient to be discharged without further pulmonary work-up after MI is ruled out. At the very least, always suspect PTE when a patient presents with tachycardia and tachypnea and consider ordering a ventilation-perfusion (V/Q) scan if suspicions are high. Pulmonary infarction usually signifies the presence of a small PTE and typically causes severe pleuritic pain.

33. A 55-year-old man presents with a 2-day history of hemoptysis. He reports an acute onset of eight episodes of coughing bright blood. He has coughed a teaspoon worth of blood on average in each instance. He reports no other symptoms, except for a cough productive of 5- 10 mL of sputum each morning. He has a history of chronic obstructive pulmonary disease, for which he takes bronchodilators. He has smoked 30 cigarettes daily for the past 30 years. Physical examination is normal, and an x - ray film is clear. Which of the following is the most likely cause of this man's hemoptysis?

- A. Alpha-1 antitrypsin deficiency
- B. Bronchiectasis
- C. Bronchogenic carcinoma
- D. Chronic bronchitis
- E. Pulmonary tuberculosis

The correct answer is D. This patient most likely has chronic bronchitis, as evidenced by his cough and sputum production. Bronchitis involves excessive mucus production in the bronchial tree, leading to a productive cough for at least 3 months during each of 2 successive years. It is among the most common causes of hemoptysis in adults. However, lung cancer must be high on the differential diagnosis list.

A normal chest x-ray film does not necessarily rule out bronchiectasis. Bronchiectasis is a pathologic, irreversible dilatation of the bronchi that is caused by destruction of the bronchial wall, usually resulting from suppurative infection of an obstructed bronchus. Symptoms may occasionally include hemoptysis. Bronchogenic carcinoma must be considered in someone with a long smoking history and hemoptysis. Statistically, bronchitis is still more common. Chest x-ray films can be clear in lung cancer; if there is clinical suspicion, this patient must get a chest CT to rule out a mass.

Chest x-ray films can be clear in a patient with pulmonary tuberculosis. Radiographic signs, if present, include apical granulomas on lung chest x-ray. Other symptoms may include cough, weight loss, and hemoptysis. Acid fast bacilli (AFB) smear and cultures may be positive for *Mycobacterium tuberculosis*. Pulmonary tuberculosis is less likely than chronic bronchitis in this smoker.

34. A previously healthy 23-year-old man complains of a febrile illness that developed over a 2-day period. He has had temperatures to 39.4° C, with rigors, cough productive of mucopurulent sputum and right chest pain pulse is 110/min and RR is 22/min. There is no cyanosis. Diminished tactile fremitus, dullness on percussion, and bronchial breathing are present in the right lower lung. A chest x-ray film shows consolidation of the right lower lobe. Microscopic examination of the sputum reveals gram-positive diplococci patient denies previous allergic drug reactions. Which of the following is the most appropriate pharmacotherapy?

- A. Cefazolin
- B. Erythromycin
- C. Penicillin
- D. Tetracycline
- E. Trimethoprim-sulfamethoxazole

Correct answer is C. The symptomatology, x-ray evidence of lobar consolidation, and the finding of gram-positive diplococci in the sputum all support a diagnosis of acute pneumonia due to *Pneumococcus*. Microscopic examination of gram-stained sputum is more sensitive than culture in identifying *Pneumococcus*. Penicillin is the agent of choice, administered orally (penicillin V) on an outpatient basis in uncomplicated pneumonia, or parenterally (IV penicillin G) for seriously ill patients.

Extended Matched Questions (EMQs)

1. Shortness of breath

- | | |
|----------------------------------|-----------------------------|
| A. ARDS | G. Pneumonia |
| B. Bronchogenic carcinoma | H. Pneumothorax |
| C. Cystic fibrosis | I. Pulmonary edema |
| D. Extrinsic allergic alveolitis | J. Pulmonary embolus |
| E. Fibrosing alveolitis | K. Right sided rib fracture |
| F. Pleural effusion | |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 63-year-old man presents to ER with weight loss, cough, hemoptysis and shortness of breath. On examination he is anemic, clubbed and apyrexial. ☐
2. A 65-year-old man presents with shortness of breath and cough productive of pink frothy sputum. On examination he is cyanosed and tachycardic, and has bibasal end-inspiratory crackles. His jugular venous pressure (JVP) is elevated. ☐
3. A 70-year-old woman presents with fever, rigors, shortness of breath and right-sided pleuritic chest pain. On examination the right side of the chest shows reduced expansion, dull percussion and increased tactile vocal fremitus. ☐
4. A 30-year-old farmer presents with repeated episodes of fever, rigors, dry cough and shortness of breath with onset several hours after starting work. On examination he is pyrexial with coarse end-inspiratory crackles. His chest radiograph shows mid-zone mottling. ☐
5. A 21-year-old man has a productive cough, wheeze and steatorrhea. On examination he is clubbed and cyanosed, and has bilateral coarse crackles. ☐

Answers: B I G D C

1. A 63-year-old man presents to ER with weight loss, cough, hemoptysis and shortness of breath. On examination he is anemic, clubbed and apyrexial.

Answer is B: Remember respiratory causes of clubbing: carcinoma of the bronchus, mesothelioma, bronchiectasis, abscess, empyema, cryptogenic fibrosing alveolitis and cystic fibrosis. COPD and asthma are not causes of clubbing.

2. A 65-year-old man presents with shortness of breath and cough productive of pink frothy sputum. On examination he is cyanosed and tachycardic, and has bibasal end-inspiratory crackles. His JVP is elevated.

Answer is I: This is the presentation of acute pulmonary edema secondary to left ventricular failure. Pulmonary edema occurs because left-sided filling pressures are elevated, causing high pulmonary capillary pressures. This results in transudation of fluid from the plasma into the alveoli, impairing gas exchange and reducing pulmonary compliance. Sputum is often pink as a result of leakage of red blood cells into the alveoli which is a consequence of ruptured pulmonary capillaries.

3. A 70-year-old woman presents with fever, rigors, shortness of breath and right-sided pleuritic chest pain. On examination the right side of the chest shows reduced expansion, dull percussion and increased tactile vocal fremitus.

Answer is G: Reduced expansion, dullness to percussion and increased tactile vocal fremitus, in combination, suggest consolidation. Bronchial breathing is also a feature of consolidation and results from transmission of airway sounds through the consolidated lung to the periphery. Strictly speaking, consolidation refers to the replacement of alveolar air by fluid, cells, tissue or other material. The most common cause is pneumonia.

4. A 30-year-old farmer presents with repeated episodes of fever, rigors, dry cough and shortness of breath with onset several hours after starting work. On examination he is pyrexial with coarse end inspiratory crackles. His chest radiograph shows mid-zone mottling.

Answer is D: This is a classic presentation of extrinsic allergic alveolitis (EAA), which is a hypersensitivity reaction to inhaled antigens. In farmers, the antigen often responsible is thermophilic actinomycetes in moulds hay or *Aspergillus clavatus* on germinating barley. Lung function tests reveal a reversible restrictive defect. The cause of the reaction may be determined by finding serum-precipitating antibodies. In chronic EAA a honeycomb lung can sometimes be seen on the chest radiograph. Acute cases may be treated with corticosteroids but allergen avoidance is the key preventive measure.

5. A 21-year-old man has a productive cough, wheeze and steatorrhea. On examination he is clubbed and cyanosed, and has bilateral coarse crackles.

Answer is C: Cystic fibrosis is an autosomal recessive condition associated with a mutation in the CFTR (cystic fibrosis transmembrane conductance regulator) gene on chromosome 7. Patients are susceptible to recurrent respiratory infection and the development of bronchiectasis. Acute exacerbations are often caused by *Pseudomonas* spp. which may be highly resistant to antibiotics. Hemoptysis is common and may indicate the presence of Aspergilloma. Pancreatic insufficiency usually develops resulting in malabsorption and steatorrhea. Growth and puberty are delayed in most patients. Males are usually infertile as a result of the failure of the vas deferens and epididymis to develop. High sweat sodium and chloride concentrations (> 60 mmol/l) are highly suggestive of the disease.

2. Breathlessness

- | | |
|-------------------------------------|-----------------------|
| A. Anaemia | G. Pleural effusion |
| B. Bronchial asthma | H. Pneumonia |
| C. Bronchogenic carcinoma | I. Pneumothorax |
| D. Cryptogenic fibrosing alveolitis | J. Pulmonary edema |
| E. Extrinsic allergic alveolitis | K. Pulmonary embolism |
| F. Inhaled foreign body | |

For each clinical scenario below, give the most likely cause for the clinical findings. Each option may be used only once.

1. A 52-year-old woman on HRT presents with a swollen left calf, chest pain and shortness of breath. ☐
2. A 78-year-old man has been short of breath for a few weeks. His chest radiography shows a right basal shadow rising towards the axilla. ☐
3. A 54-year-old woman presents with a 9-month history of progressive breathlessness and cyanosis. Clinical examination reveals clubbing and bilateral inspiratory crackles. ☐
4. A 27-year-old farmer presents with fever, malaise, cough and breathlessness, which he has had for a few days. His symptoms were worse in the evening. Clinical examination demonstrated coarse end-inspiratory crackles. ☐
5. A 34-year-old tall, slim porter presents with sudden-onset chest pain and breathlessness. He had had similar episodes in the past. ☐

Answers: K G D E I

1. A 52-year-old woman on HRT presents with a swollen left calf, chest pain and shortness of breath.

Answer is K: HRT is a risk factor for deep vein thrombosis (DVT), which can then result in pulmonary embolism.

2. A 78-year-old man has been short of breath for a few weeks. His chest radiography shows a right basal shadow rising towards the axilla.

Answer is G: Pleural effusion has a characteristic shadow on the CXR, rising towards the axilla.

3. A 54-year-old woman presents with a 9-month history of progressive breathlessness and cyanosis. Clinical examination reveals clubbing and bilateral inspiratory crackles.

Answer is D: Clubbing and bilateral inspiratory crackles typically point towards CFA, particularly if the patient is above 50 years old.

4. A 27-year-old farmer presents with fever, malaise, cough and breathlessness, which he has had for a few days. His symptoms were worse in the evening. Clinical examination demonstrated coarse end-inspiratory crackles.

Answer is E: EAA is more common in specific occupations, e.g. farmers, ventilation system workers and vets. It can present as an acute, subacute or chronic form.

5. A 34-year-old tall, slim porter presents with sudden-onset chest pain and breathlessness. He had had similar episodes in the past.

Answer is I: Primary spontaneous pneumothorax tends to occur in young people without underlying lung problems, though it is more common in tall male smokers.

3. Causes of pneumonia

- | | |
|------------------------------------|------------------------------------|
| A. <i>Aspergillus fumigatus</i> | H. <i>Moraxella catarrhalis</i> |
| B. <i>Chlamydia pneumoniae</i> | I. <i>Mycoplasma pneumoniae</i> |
| C. <i>Chlamydia psittaci</i> | J. <i>Pneumocystis jiroveci</i> |
| D. <i>Coxiella burnetii</i> | K. <i>Pseudomonas</i> sp. |
| E. Cytomegalovirus (CMV) infection | L. <i>Staphylococcus aureus</i> |
| F. <i>Escherichia coli</i> | M. <i>Streptococcus pneumoniae</i> |
| G. <i>Legionella pneumophila</i> | N. Varicella zoster |

For each clinical scenario below, give the most likely cause for the clinical findings. Each option may be used only once.

1. An 80-year-old man presents with bilateral cavitating bronchopneumonia after an influenza infection. ☐
2. A 24-year-old student presents with severe headache, fever, dry cough and arthralgia. He has recently bought several parrots and was previously fit and well. ☐
3. A 40-year-old man with HIV presents with fever, dry cough, weight loss and exertional dyspnea. ☐
4. A 75-year-old man presents with headache, dry cough, anemia and a skin rash. Blood tests detect cold agglutinins. ☐
5. A 25-year-old air-conditioning technician, who suffered from flu-like symptoms a week ago, has developed a dry cough. His chest radiograph shows multilobar shadowing. Blood tests show hyponatremia and lymphopenia. Urinalysis reveals hematuria. ☐

Answers: L C J I G

1. An 80-year-old man presents with bilateral cavitating bronchopneumonia after an influenza infection.

Answer is L: Although not a common pathogen in community-acquired pneumonia, *Staphylococcus aureus* may cause pneumonia in debilitated patients, including elderly people and those recovering from influenza. It is also seen in intravenous drug users (IVDUs) as a consequence of hematological seeding from infected needles, often in association with staphylococcal endocarditis of the tricuspid valve. Flucloxacillin is the treatment of choice for staphylococcal infection.

2. A 24-year-old student presents with severe headache, fever, dry cough and arthralgia. He has recently bought several parrots and was previously fit and well.

Answer is C: Psittacosis is a rare cause of community-acquired pneumonia. It should be suspected in any patient presenting with lower respiratory tract symptoms and signs who has a history of exposure to birds. No acute diagnostic tests are available and diagnosis is made in retrospect by demonstrating a rising titer of complement-fixing antibody. As with other atypical cases of pneumonia such as *Legionella pneumophila* and *Mycoplasma* spp., if psittacosis is suspected, treatment should be commenced with a macrolide antibiotic.

3. A 40-year-old man with HIV presents with fever, dry cough, weight loss and exertional dyspnea.

Answer is J: This is a presentation of *Pneumocystis jiroveci* infection, which is a common complication of HIV infection (AIDS-defining illness). It may also occur as an opportunistic infection in other immunocompromised patients such as those receiving immunosuppressive drugs and cancer chemotherapy.

4. A 75-year-old man presents with headache, dry cough, anemia and a skin rash. Blood tests detect cold agglutinins.

Answer is I: Mycoplasma infection is the most common atypical cause of community acquired pneumonia. Cases usually occur during an epidemic, which may give the clue to diagnosis. A characteristic feature is the autoimmune hemolytic anemia caused by the presence of cold agglutinins. Other extrapulmonary features include erythema multiform, myopericarditis and meningoencephalitis. Diagnosis is often made in retrospect via detection of a rising antibody titer. If mycoplasma infection is suspected on clinical grounds, a macrolide should be commenced empirically.

5. A 25-year-old air-conditioning technician, who suffered from flu-like symptoms a week ago, has developed a dry cough. His chest radiograph shows multilobar shadowing. Blood tests show hyponatremia and lymphopenia. Urinalysis reveals hematuria.

Answer is G: *Legionella pneumophila* is a rare cause of atypical community acquired pneumonia. Cases may occur sporadically, although outbreaks associated with infected air-conditioning systems are well recognized. The patient often complains of a preceding flu-like illness before frank lower respiratory symptoms, e.g. dry cough and dyspnea. Other features such as hyponatremia and lymphopenia may assist in diagnosis. Urinary antigen test can be performed rapidly by testing for the presence of Legionella antigen in the urine (high sensitivity and specificity). Simple prevention measures such as adequate chlorination of the water supply are important to prevent outbreaks.

4. Hemoptysis

- | | |
|---------------------------|----------------------------|
| A. Bronchiectasis | G. Pneumonia |
| B. Bronchogenic Carcinoma | H. Polyarteritis Nodosa |
| C. Churg-Strauss syndrome | I. Pulmonary edema |
| D. Goodpasture's syndrome | J. Pulmonary embolism |
| E. Hemophilia | K. Tuberculosis |
| F. Hemothorax | L. Wegner's granulomatosis |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 65-year-old smoker presents with shortness of breath, gallop rhythm and production of pink frothy sputum. ☐
2. A 24-year-old man initially complaining of cough and intermittent hemoptysis presents a few weeks later with hematuria. Biopsy confirms a crescentic glomerulonephritis. Renal biopsy shows linear pattern deposition on immunofluorescence. ☐
3. A 34-year-old woman originally complaining of nasal obstruction develops cough, hemoptysis and pleuritic chest pain. Her chest radiograph shows multiple nodular masses. ☐
4. A 22-year-old man presents with fever, night sweats, weight loss and cough productive of cup full of blood. Ziehl-Neelsen stain is positive for acid-fast bacilli. ☐
5. A 35-year-old business man returns from a trip abroad and collapses at the airport with hemoptysis and pleuritic chest pain. He has a sinus tachycardia and his ECG shows right axis deviation. ☐

Answers: I D L K J

1. A 65-year-old smoker presents with shortness of breath, gallop rhythm and production of pink frothy sputum.

Answer is I: This is the presentation of pulmonary edema secondary to left ventricular failure as evidenced by the other cardiac signs, e.g. increased JVP, gallop rhythm. In this patient the most likely cause is ischemic heart disease and there should be a high index of suspicion of an acute underlying ischemic event, e.g. myocardial infarction.

2. A 24-year-old man initially complaining of cough and intermittent hemoptysis presents a few weeks later with hematuria. Biopsy confirms a crescentic glomerulonephritis. Renal biopsy shows linear pattern deposition on immunofluorescence.

Answer is D: This patient has presented with a pulmonary renal syndrome. Differential diagnosis includes Wegener's granulomatosis, microscopic polyangiitis and Goodpasture's disease (GD). Serology may assist in diagnosis in that Wegener's granulomatosis is associated with cANCA (cytoplasmic antineutrophil cytoplasmic antibody) (PR3) and anti-glomerular basement membrane (GBM) antibodies of the IgG type can be found in GD. The definitive diagnosis is made on renal biopsy where GD shows a classic linear staining on direct immunofluorescence. Renal biopsy also allows an assessment of the severity of the renal lesion. GD is a condition resulting from the presence of anti-GBM antibodies. It is believed that the binding of these antibodies to the kidney glomerular membrane and lung alveolar membrane mediates a type II hypersensitivity reaction, which is responsible for the pathology in those organs.

There is a strong association with HLA-DR2. The disease is said to occur more frequently in smokers and those exposed to the fumes of hydrocarbon solvents. Sufferers should avoid smoking, which can aggravate respiratory symptoms and increase the likelihood of lung hemorrhage. Treatment for this condition is immunosuppressive, e.g. corticosteroids, but plasmapheresis to remove the anti-GBM antibodies is also successful.

3. A 34-year-old woman originally complaining of nasal obstruction develops cough, hemoptysis and pleuritic chest pain. Her chest radiograph shows multiple nodular masses. **Answer is L:** Wegener's granulomatosis is a small artery vasculitis (PR3 ANCA positive), which is characterized by lesions involving the upper respiratory tract, lungs and kidneys. Look out for eye signs that are present in up to 50 percent, e.g. scleritis, uveitis, retinitis. However, the vasculitis and granuloma deposition can affect any organ and so less common associated symptoms and signs are legion. Treatment options include the use of immunosuppressive medications, e.g. high-dose corticosteroids with cyclophosphamide.

4. A 22-year-old man presents with fever, night sweats, weight loss and cough productive of cup full of blood. Ziehl-Neelsen stain is positive for acid-fast bacilli (AFB).

Answer is K: The symptoms are suggestive of TB but the diagnosis is clinched by the presence of AFBs with Ziehl-Neelsen staining. Although the lung is the most commonly affected organ in TB, infection may present in other sites, e.g. urinary tract, bone, central nervous system (CNS). Miliary TB is the term used to describe widespread TB through hematological dissemination. It carries a poor prognosis.

5. A 35-year-old business man returns from a trip abroad and collapses at the airport with hemoptysis and pleuritic chest pain. He has a sinus tachycardia and his ECG shows right

axis deviation.

Answer is J: This is a classic history of pulmonary embolus (PE), although in many cases not all these features may be present. Diagnosis relies on a high index of clinical suspicion together with tests such as ventilation perfusion scanning and pulmonary angiography (not commonly performed using spiral computed tomography). Other risk factors for PE include previous thromboembolic events, oral contraceptive pill, surgery (especially pelvic surgery), immobility and inherited thrombophilia.

5. Chest radiograph pathology

- | | |
|-----------------------------|-----------------------------------|
| A. Aortic stenosis | H. Post Fracture Fat Embolism |
| B. Asbestosis | I. Previous Varicella Pneumonitis |
| C. Bronchiectasis | J. Right Lower Lobe Collapse |
| D. Caplan's Syndrome | K. Right Upper Lobe Collapse |
| E. Kartagener's Syndrome | L. Right Ventricular Failure |
| F. Left Ventricular Failure | M. Wagner's Granulomatosis |
| G. Mitral Stenosis | |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. Multiple bilateral nodules between 0.5 and 5 cm in a former miner with rheumatoid arthritis. ☐

2. Kerley B lines, bat-wing shadowing, prominent upper lobe vessels, cardiomegaly. ☐

3. Trachea deviated to right, horizontal fissure and right hilum displaced upwards. ☐

4. Double shadow right heart border, prominent left atrial appendage, left main bronchus elevation. ☐

6. Numerous calcified nodules sized less than 5 mm located predominantly in the lower zones of the lungs. ☐

Answers: D F K G I

1. Multiple bilateral nodules between 0.5 and 5 cm in a former miner with rheumatoid arthritis.

Answer is D: Caplan's syndrome is a pulmonary manifestation of rheumatoid arthritis (RA) which is characterized by the presence of pulmonary nodules. It typically occurs in patients with RA who are exposed to coal dust, although the granulomas can also appear in workers exposed to other dusts, e.g. silicosis and asbestos. Symptoms include cough, shortness of breath and hemoptysis. RA has several other respiratory manifestations/associations including fibrosing alveolitis, pleural effusions and, very rarely, obliterative bronchiolitis. RA can also affect the cricoarytenoid joints leading to upper respiratory tract obstruction.

2. Kerley B lines, bat-wing shadowing, prominent upper lobe vessels, cardiomegaly.
Answer is F: These findings are suggestive of acute left ventricular failure leading to pulmonary edema. Kerley B lines are often difficult to see in real life. Although right ventricular failure may present with cardiomegaly, pulmonary edema does not occur.

3. Trachea deviated to right, horizontal fissure and right hilum displaced upwards.
Answer is K: These chest radiograph findings are characteristic of right upper lobe collapse. Try to find the horizontal fissure because its position is a good clue to the presence of volume loss. The horizontal fissure on the right lung should run from the middle of the right hilum and can be traced to the level of the sixth rib in the axillary line. In right upper lobe collapse, the horizontal fissure will be elevated. Chest radiograph findings of a left upper lobe collapse are somewhat different. There is no left middle lobe and hence no horizontal fissure. The upper lobe is anterior to a greater proportion of the lower lobe. Hence, left upper lobe collapse can give rise to a hazy white appearance over a large part of the left lung field. This should not be confused with a pleural effusion because in collapse there will be tracheal deviation to the side of the lesion, elevation of the hilum and preservation of the costophrenic angle.

4. Double shadow right heart border, prominent left atrial appendage, left main bronchus elevation.

Answer is G: Advanced mitral stenosis is associated with characteristic findings caused by left atrial enlargement. These include elevation of the left main bronchus, widening of the carina, double right heart border and a prominent left atrial appendage. Calcification of the mitral valve may also be seen, as may pulmonary edema. Left ventricular enlargement is not a feature despite the presence of pulmonary edema.

5. Numerous calcified nodules sized less than 5 mm located predominantly in the lower zones of the lungs.

Answer is I: Multiple, small, calcified nodules may occur after varicella pneumonitis. Other causes of numerous calcified nodules include TB, histoplasmosis and chronic renal failure.

6. Chest radiograph pathology

- | | |
|-------------------------------------|----------------------------------|
| A. Aspergillosis | G. Extrinsic Allergic Alveolitis |
| B. Berylliosis | H. Mesothelioma |
| C. Bronchiectasis | I. Pneumonia |
| D. Bronchogenic Carcinoma | J. Sarcoidosis |
| E. COPD | K. Silicosis |
| F. Cryptogenic Fibrosing Alveolitis | L. Tuberculosis |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 28-year-old man presents with dry cough and progressive shortness of breath. His chest radiograph shows bilateral hilar lymphadenopathy. ☐

2. The chest radiograph of a 13-year-old boy with cystic fibrosis has tramline and ring shadows. ☐

3. A 65-year-old dockyard worker presents with weight loss and shortness of breath. He is clubbed and cachectic. His chest radiograph shows pleural calcification and a lobulated pleural mass. ☐

4. A 40-year-old woman presents with gross clubbing and progressive shortness of breath. Examination reveals fine end-inspiratory crackles. Her chest radiograph shows a ground-glass appearance of the lung. ☐

5. A 65-year-old smoker presents with shortness of breath. On the chest radiograph, eight ribs can be seen anteriorly above the diaphragm on each side of the chest in the mid-clavicular line. ☐

Answers: J C H F E

1. A 28-year-old man presents with dry cough and progressive shortness of breath. His chest radiograph shows bilateral hilar lymphadenopathy.

Answer is J: This constellation of symptoms and radiological findings is highly suggestive of sarcoidosis which is more common in black patients. Other causes of bilateral hilar lymphadenopathy include TB, malignancy (although symmetrical lymphadenopathy is rare), organic dust diseases and extrinsic allergic alveolitis.

2. The chest radiograph of a 13-year-old boy with cystic fibrosis has tramline and ring shadows.

Answer is C: Ring shadows and tram lining are a characteristic radiological finding in bronchiectasis, which is a common early complication of cystic fibrosis. Patients present with a cough productive of large amounts of purulent sputum and there can be hemoptysis. On examination the patient may be clubbed with coarse inspiratory crackles that can be heard over the infected areas of lung. Other causes of bronchiectasis include Kartagener's syndrome, pertussis and bronchial obstruction.

3. A 65-year-old dockyard worker presents with weight loss and shortness of breath. He is clubbed and cachectic. His chest radiograph shows pleural calcification and a lobulated pleural mass.

Answer is H: Mesothelioma is a consequence of previous asbestos exposure. The chest radiograph classically shows a mass with a lobulated margin. Pleural calcification suggests possible previous exposure to asbestos but, in the absence of other features, it is benign.

4. A 40-year-old woman presents with gross clubbing and progressive shortness of breath. Examination reveals fine end-inspiratory crackles. Her chest radiograph shows a ground-glass appearance of the lung.

Answer is F: Combination of shortness of breath, clubbing and fine end-inspiratory crackles suggests cryptogenic fibrosing alveolitis, which usually has an onset during middle age. Chest radiograph findings include ground-glass shadowing. As the disease progresses a 'honeycomb' lung may develop. Fibrosing alveolitis is associated with rheumatoid arthritis, systemic sclerosis and ulcerative colitis. In these cases it is not referred to as cryptogenic.

5. A 65-year-old smoker presents with shortness of breath. On the chest radiograph, eight ribs can be seen anteriorly above the diaphragm on each side of the chest in the mid-clavicular line.

Answer is E: It is usual to see no more than six ribs anteriorly above the diaphragm in the mid-clavicular line, in a Postero anterior chest radiograph taken at full inspiration. The presence of more visible ribs suggests hyperexpansion which may occur in COPD.

7. Treatment of Asthma and COPD

- | | |
|-----------------------------------|----------------------------------|
| A. Home 100% oxygen | G. Inhaled sodium cromoglycate |
| B. Inhaled beclomethasone | H. Low dose oral aminophylline |
| C. Inhaled ipratropium bromide | I. Nebulized ipratropium bromide |
| D. Inhaled Salbutamol | J. Nebulized salbutamol |
| E. Inhaled Salbutamol with spacer | K. Oral prednisolone |
| F. Inhaled salmeterol | L. Oral sodium cromoglycate |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 12-year-old girl with slight wheeze and shortness of breath despite inhaled salbutamol. ☐

2. A 22-year-old student with mild asthma that needs treatment for occasional early morning wheeze. ☐

3. A 17-year-old student complains that he has to use his salbutamol inhaler regularly to control wheezing. ☐

4. A 32-year-old patient taking maximum dose-inhaled therapy and slow-release theophylline shows persistently inadequate control of symptoms. ☐

5. A 25-year-old woman requires add-on therapy because inhaled beclomethasone and salbutamol do not adequately combat her symptoms. ☐

Answers: E D B K F

1. A 12-year-old girl with slight wheeze and shortness of breath despite inhaled salbutamol.

Answer is E: This patient's symptoms may respond to inhaled salbutamol if it can be delivered effectively to the lungs. Use of a spacer improves delivery in children and patients with poor inhaler technique. In young patients, it is particularly important to optimize bronchodilator therapy as early initiation of corticosteroids may lead to growth retardation.

2. A 22-year-old student with mild asthma that needs treatment for occasional early morning wheeze.

Answer is D: This is step 1 of the British Thoracic Society (BTS) guidelines for the management of asthma.

3. A 17-year-old student complains that he has to use his salbutamol inhaler regularly to control wheezing.

Answer is B: In patients who require frequent doses of inhaled bronchodilators to control symptoms regular inhaled corticosteroids should be used. This is a part of step 2 of the BTS guidelines for the management of asthma in adults. Step 2 refers to regular preventer therapy and involves the daily use of inhaled steroid at a dosage appropriate to the severity of disease.

4. A 32-year-old patient taking maximum dose-inhaled therapy and slow-release theophylline shows persistently inadequate control of symptoms.

Answer is K: Although oral glucocorticoids should be avoided where possible because of long-term adverse effects, all other therapeutic opportunities have been exhausted in this patient. The use of oral steroids is a part of step 5 of the BTS guidelines for the management of asthma. A patient with such poorly controllable asthma should be under specialist care.

5. A 25-year-old woman requires add-on therapy because inhaled beclomethasone and salbutamol do not adequately combat her symptoms.

Answer is F: Under the BTS guidelines there are two options for escalation of therapy for patients not adequately controlled with a regular bronchodilator inhaler and low-dose inhaled corticosteroids. Either a long action agonist can be added, as is the case in this patient, or the dose of inhaled steroid can be increased. This is step 3 of the British Thoracic Society guidelines.

8. Emergency management: Respiratory Distress

- | | |
|--|---|
| A. 100 % O ₂ , nebulized salbutamol, and intramuscular adrenalin | G. Chest radiograph |
| B. 100 % O ₂ , nebulized salbutamol, and intravenous hydrocortisone | H. Emergency tracheostomy |
| C. 28% O ₂ , nebulized salbutamol, and intramuscular adrenalin | I. Intubation |
| D. 28% O ₂ , nebulized salbutamol, and intravenous hydrocortisone | J. Left sided decompression |
| E. 28% O ₂ , nebulized salbutamol, and oral prednisolone | K. Nasal intermittent positive pressure ventilation |
| F. Chest drain | L. Right sided decompression |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 65-year-old man with long-standing COPD presents with severe shortness of breath. He has been treated with oxygen and nebulized bronchodilators. An hour later: PaO₂ 6.0 kPa (on max. O₂), PaCO₂ 16.0 kPa, pH 7.2. (Normal range : PaO₂: 11.3- 12.6, PaCO₂: 4.7- 6) ☐
2. A 17-year-old woman presents with wheeze and marked perioral swelling: PaO₂ 7.0 kPa (on 28 per cent O₂), PaCO₂ 4.1 kPa. ☐
3. A 14 year old with asthma presents with an acute severe asthma attack. PaO₂ 10.0 kPa (on 28 per cent O₂), PaCO₂ 8.0 kPa. ☐
4. A 28-year-old man involved in a road traffic accident presents with severe respiratory distress. Examination reveals decreased expansion on the right side of the chest with mediastinal shift to the left. ☐
5. A young man presents with an acute onset shortness of breath. Examination reveals decreased expansion on the right: SaO₂ 95 per cent. ☐

Answers: K A B L G

1. A 65-year-old man with long-standing COPD presents with severe shortness of breath. He has been treated with oxygen and nebulized bronchodilators. An hour later: PaO_2 6.0 kPa (on max. O_2), $PaCO_2$ 16.0 kPa, pH 7.2.

Answer is K: This patient has a severe exacerbation of COPD and consequent type II respiratory failure that has responded poorly to medical therapy. Conventional management would involve formal intubation, ventilation and transfer to an intensive care unit (ICU). The use of non-invasive intermittent positive pressure ventilation (NIPPV) in such patients has been associated with a reduction in the number of patients requiring formal intubation. This is advantageous because anesthesia and intubation can be very difficult in a patient with respiratory failure. NIPPV should be tried unless the patient is in extremis. Successful NIPPV requires a conscious and cooperative patient.

2. A 17-year-old woman presents with wheeze and marked perioral swelling: PaO_2 7.0 kPa (on 28 per cent O_2), $PaCO_2$ 4.1 kPa.

Answer is A: This is a classic presentation of acute anaphylaxis, e.g. a type I IgE mediated hypersensitivity reaction. The symptoms and signs include rash, edema, tachycardia, hypotension and wheeze. Laryngeal edema giving rise to upper airway obstruction is particularly worrying because it may impede endotracheal intubation. Initial treatment of choice is 0.5 ml epinephrine (adrenaline) 1:1000 solution (500 μ g) delivered intramuscularly which can be repeated in the absence of clinical improvement or if deterioration occurs. Intravenous epinephrine is dangerous and should be given slowly only in a dilution of at least 1 in 10 000 in an immediately life-threatening situation, e.g. frank cardiac arrest.

3. A 14 year old with asthma presents with an acute severe asthma attack: PaO_2 10.0 kPa (on 28 per cent O_2), $PaCO_2$ 8.0 kPa

Answer is B: The British Thoracic Society suggests that features of a severe asthma attack include peak expiratory flow rate (PEFR) < 50 percent predicted/best, respiration rate > 25 breaths/min, pulse > 110 beats/min and inability to complete a sentence with one breath. Markers of a life-threatening attack include a PEFR < 33 per cent of predicted/ best, silent chest, cyanosis, poor respiratory effort, bradycardia, arrhythmia, hypotension, exhaustion, confusion, PaO_2 < 8 kPa, acidosis with pH < 7.35, high $PaCO_2$. Intubation and transfer to the ICU must be considered if the patient is not responding to drug therapy. This patient is both hypoxic and retaining CO_2 . This is a poor prognostic sign because people with acute asthma usually have a low CO_2 . The presence of a high CO_2 is associated with imminent respiratory collapse. Despite elevated CO_2 , 100 per cent O_2 should be given because, in this patient, there is no risk of respiratory depression resulting from a hypoxic ventilatory drive. Between attacks the patient's CO_2 should be within the normal range. It is a common mistake to restrict oxygen to patients with asthma and a high CO_2 .

4. A 28-year-old man involved in a road traffic accident presents with severe respiratory distress. Examination reveals decreased expansion on the right side of the chest with mediastinal shift to the left.

Answer is L: Tension pneumothorax is a medical emergency and management should not be delayed by obtaining a chest radiograph. Air is being drawn into the pleural space with each inspiration but cannot escape during expiration. The mediastinum is therefore shifted to the contralateral side. This prejudices both ventilation of the other lung and filling of the

heart. In this scenario there is reduced expansion on the right side and mediastinal shift to the left, so decompression on the right side is indicated. A cannula must be inserted into the second intercostal space in the mid-clavicular line of the affected side until a functioning intercostal tube can be positioned.

5. A young man presents with an acute onset shortness of breath. Examination reveals decreased expansion on the right: SpO_2 95 per cent.

Answer is G: A chest radiograph is indicated here to confirm the diagnosis of pneumothorax and to assess the degree of collapse. In healthy patients a small pneumothorax will often heal without further intervention. The patient should be observed for 6 hours and, if there is no increase in the size of the pneumothorax, may be discharged with early follow-up and repeated chest radiograph. Spontaneous pneumothorax is relatively common in young adults (especially tall thin men) and older patients with emphysema. In patients with thoracic disease/large pneumothorax, simple aspiration is recommended as first line treatment. If this is unsuccessful, a chest drain will be required.

9. Management of COPD

- A. 100% O₂ and amoxicillin
- B. 28% O₂ inhaled bronchodilators and intravenous amoxicillin
- C. 60 % O₂, nebulized salbutamol, oral prednisolone and oral amoxicillin
- D. ICU admission and intubation
- E. Inhaled salbutamol
- F. Intermittent Positive pressure Ventilation
- G. Intravenous salbutamol
- H. Intravenous salbutamol
- I. Long term O₂ therapy
- J. Lung transplantation
- K. Nebulized salbutamol, ipratropium, oral prednisolone and oral amoxicillin
- L. Oral aminophylline

For each clinical scenario below, give the most likely cause for the clinical findings. Each option may be used only once.

1. A previously healthy 65-year-old smoker with early COPD complains of shortness of breath on exertion. ☐
2. A 65-year-old woman with longstanding COPD presents with shortness of breath and cough productive of colored sputum. ☐
3. A 70-year-old man admitted with acute severe exacerbation of COPD does not respond to oxygen and nebulized bronchodilators. ☐
4. A 65-year-old patient with advanced COPD treated with bronchodilators and steroids still feels breathless. His baseline PaO₂ is around 6.5 kPa. ☐
5. A 55-year-old patient with COPD requires regular add-on therapy after bronchodilators do not control symptoms. ☐

Answers: E K F I L

1. A previously healthy 65-year-old smoker with early COPD complains of shortness of breath on exertion.

Answer is E: Stopping smoking, encouraging exercise and reducing obesity should all be encouraged. The use of inhaled bronchodilators is first-line pharmacological therapy for early COPD.

2. A 65-year-old woman with longstanding COPD presents with shortness of breath and cough productive of colored sputum.

Answer is K: This is the presentation for an infective exacerbation of COPD.

3. A 70-year-old man admitted with acute severe exacerbation of COPD does not respond to oxygen and nebulized bronchodilators.

Answer is F: If such a patient deteriorates on medical therapy, early use of IPPV may improve outcome and avoid intubation.

4. A 65-year-old patient with advanced COPD treated with bronchodilators and steroids still feels breathless. His baseline PaO₂ is around 6.5 kPa.

Answer is I: Long-term oxygen therapy should be considered in clinically stable nonsmokers with PaO₂ < 7.3 kPa. There is evidence to suggest that keeping the PaO₂ > 8.0 kPa for more than 15 h every day increases survival.

5. A 55-year-old patient with COPD requires regular add-on therapy after bronchodilators do not control symptoms.

Answer is L: Oral aminophylline taken before going to bed may be particularly helpful for patients complaining of symptoms in the early hours of the morning. Aminophylline should be used with care because it has a narrow therapeutic index. Signs of toxicity include nausea, vomiting and cardiac arrhythmias.

10. Treatment of respiratory Infections

- | | |
|--|----------------------------------|
| A. Ceftazidime | G. Intravenous co-trimoxazole |
| B. High dose AZT (zidovudine) and pyrazinamide | H. Intravenous Flucloxacillin |
| C. Intravenous amoxicillin | I. Intravenous teicoplanin |
| D. Intravenous benzyl penicillin | J. Oral amoxicillin |
| E. Intravenous cefuroxime and erythromycin | K. Oral Flucloxacillin |
| F. Intravenous ciprofloxacin | L. Oral isoniazid and rifampicin |
| | M. Oral tetracycline |

For each clinical scenario below, give the most likely cause for the clinical findings. Each option may be used only once.

- Standard therapy for community-acquired pneumococcal pneumonia not requiring hospital admission. ☐
- A 35-year-old patient on the ward admitted to hospital 10 days ago presents with severe pneumonia. ☐
- A 40-year-old builder presents with a severe community-acquired pneumonia. Atypical pathogens are suspected. ☐
- A 22-year-old HIV-positive individual on anti-retroviral therapy presents with *Pneumocystis jirovecii* pneumonia. ☐
- A 19-year-old man contracts pneumonia with symptoms of headache, fever and dry cough. Serology shows evidence of chlamydia infection. ☐

Answers: J A E G M

1. Standard therapy for community-acquired pneumococcal pneumonia not requiring hospital admission.

Answer is J: Oral amoxicillin is used. Oral erythromycin can be prescribed as an alternative if the patient is allergic to penicillin or in combination with amoxicillin if an atypical organism is suspected.

2. A 35-year-old patient on the ward admitted to hospital 10 days ago presents with severe pneumonia.

Answer is A: This infection is hospital acquired and therefore the range of pathogens is likely to be different from those causing community-acquired pneumonia. Such pathogens include Gram-negative aerobes, e.g. *Pseudomonas* spp., and are often multiple antibiotics resistant. Third generation cephalosporin, e.g. Ceftazidime, have some anti-pseudomonal activity and can prove effective in these circumstances.

3. A 40-year-old builder presents with a severe community-acquired pneumonia. Atypical pathogens are suspected.

Answer is E: This is standard therapy for a severe community-acquired pneumonia. Rifampicin can be added empirically if there is a high clinical suspicion of *Legionella* infection.

4. A 22-year-old human immunodeficiency virus (HIV)-positive individual on anti-retroviral therapy presents with *Pneumocystis jirovecii* pneumonia.

Answer is G: Treatment of choice is high-dose co-trimoxazole delivered intravenously for 2–3 weeks. Intravenous pentamidine may be used if co-trimoxazole is contraindicated or not tolerated. Corticosteroids are often used as an adjunct to treatment if there is hypoxemia.

5. A 19-year-old man contracts pneumonia with symptoms of headache, fever and dry cough. Serology shows evidence of chlamydia infection.

Answer is M: Chlamydial pneumonia often presents with a biphasic illness: upper respiratory tract symptoms precede the pneumonia. Diagnosis is usually made retrospectively. Tetracycline is the treatment of choice.

Short Heading Questions (SHQs)

1) Bilateral pleural effusion is commonly seen in all **EXCEPT**:

- A. SLE
- B. Nephrotic syndrome
- C. Pulmonary tuberculosis
- D. Congestive cardiac failure
- E. After coronary artery bypass graft

2) Hemorrhagic pleural effusion may be seen in:

- A. Cirrhosis of liver
- B. Pulmonary tuberculosis
- C. SLE
- D. Myxedema
- E. Nephrotic syndrome

3) Pleural rub is characteristically:

- A. Uni phasic
- B. Superficial, scratchy
- C. Alters with coughing
- D. Never palpable
- E. Present over a pleural effusion

4) Bronchial breath sound is found in all except:

- A. Collapse with patent bronchus
- B. Bronchial asthma
- C. Superficial, big, empty cavity with patent bronchus.
- D. Broncho pleural fistula
- E. Lobar pneumonia

5) Bronchophony may be found in:

- A. Pneumothorax
- B. Empyema
- C. Lobar Consolidation
- D. Pleural effusion.
- E. Chylothorax

6) Pink, frothy and profuse sputum is seen in:

- A. Pneumoconiosis
- B. Lobar pneumonia
- C. Acute pulmonary edema
- D. Aspergilloma
- E. ARDS

7) P-pulmonale in ECG is seen in:

- A. Hydropneumothorax
- B. Chronic cor pulmonale
- C. Pulmonary tuberculosis
- D. Allergic bronchopulmonary Aspergillosis
- E. Wolff-Parkinson-White syndrome

8) Low voltage in ECG is seen in:

- A. Thin chest wall
- B. Consolidation
- C. Hyperthyroidism
- D. Emphysema
- E. Dextrocardia

9) Bilateral hilar lymphadenopathy is seen in all except:

- A. Sarcoidosis
- B. Bronchogenic carcinoma
- C. Pneumoconiosis
- D. Lymphoma
- E. Aspergillosis

10) Regarding hypoventilation all are true except:

- A. Occurs in severe kyphoscoliosis
- B. Hypoxemia
- C. Hypercapnia
- D. Hypoxemia is not corrected by 100% O₂
- E. Occurs at high altitude

11) Which does not belong to the clinical manifestation of bronchial asthma:

- A. Chest pain
- B. Dyspnea
- C. Wheeze
- D. Cough
- E. Rhonchi

12) In lobar pneumonia, which is not true:

- A. Trachea deviated to the opposite side
- B. Woody dullness on percussion
- C. Tubular breath sound
- D. Presence of whispering pectoriloquy
- E. Tachypnea

13) Which is not a part of 'Kartagener's syndrome':

- A. Dextrocardia
- B. Sinusitis
- C. Impotence
- D. Bronchiectasis
- E. Infertility

14) Chronic respiratory failure is not seen in:

- A. Diffuse interstitial fibrosis
- B. Emphysema
- C. Pneumothorax
- D. Chronic bronchitis
- E. Kyphoscoliosis

15) Lung abscess is not a complication of:

- A. Malignancy
- B. Bronchopneumonia
- C. Wegener's granulomatosis
- D. Suppurative staphylococcal pneumonia
- E. Pulmonary embolism

16) Symptoms of acute pulmonary thromboembolism include all except:

- A. Substernal chest pain
- B. Hemoptysis
- C. Breathlessness
- D. Syncope
- E. Sputum production

17) Which is false regarding Pickwickian syndrome

- A. Marked obesity
- B. Hyperventilation
- C. Somnolence
- D. Right-sided heart failure
- E. Systemic hypertension

18) Commonest histologic variety of bronchogenic carcinoma is:

- A. Small cell carcinoma
- B. Large cell carcinoma
- C. Epidermoid carcinoma
- D. Adenocarcinoma
- E. Pancoast's tumor

19) Investigation of highest diagnostic efficacy in acute pulmonary Thromboembolism is

- A. ECG
- B. Arterial blood gas estimation
- C. Contrast-enhanced spiral
- D. Ventilation-perfusion lung scans
- E. Echocardiography

20) Acute lung injury (ARDS) should be differentiated from:

- A. Acute LVF
- B. Congestive cardiac failure
- C. Acute severe asthma
- D. Spontaneous pneumothorax
- E. Narcotic overdose

21) The dome of diaphragm is elevated in:

- A. Emphysema
- B. Pleural effusion
- C. Cirrhosis of liver
- D. Diaphragmatic palsy
- E. Asbestosis

22) All of the following are complicated by cyanosis except:

- A. Respiratory failure
- B. Lung abscess
- C. Acute lung injury
- D. Pulmonary thromboembolism
- E. Pulmonary arteriovenous fistula

23) Bronchial adenoma most commonly present as:

- A. Cough
- B. Stridor
- C. Recurrent hemoptysis
- D. Chest pain
- E. Coin shadow in chest x-ray

24) Nocturnal cough is classically found in all except:

- A. Post-nasal drip
- B. Tropical eosinophilia
- C. Left ventricular failure
- D. Recurrent laryngeal nerve palsy
- E. GERD

25) Hemorrhagic pleural effusion is not characteristic of:

- A. Systemic lupus erythematosus
- B. Acute pulmonary thromboembolism
- C. Tuberculous effusion
- D. Acute pancreatitis
- E. Metastatic cancer

26) In allergic asthma, the most important mediators for pathogenesis is:

- A. Thromboxane A2
- B. Leukotrienes
- C. Prostaglandins
- D. Bradykinin
- E. Neuropeptides

27) Which of the anti-tuberculosis drugs should be totally avoided in pregnancy:

- A. INH
- B. Pyrazinamide
- C. Rifampicin
- D. Streptomycin
- E. Ethambutol

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- A. INH
- B. Pyrazinamide
- C. Rifampicin
- D. Streptomycin
- E. Ethambutol

28) Which is correct in type II respiratory failure:

- A. $p\text{Po}_2$ and $p\text{Pco}_2$
- B. $p\text{Po}_2$ and normal $p\text{Pco}_2$
- C. Normal $p\text{Po}_2$ and $n\text{Pco}_2$
- D. $p\text{Po}_2$ and $n\text{Pco}_2$
- E. Normal $p\text{Po}_2$ and normal $p\text{Pco}_2$

29) The commonest cause of acute cor pulmonale is:

- A. Lobar consolidation
- B. Pneumothorax
- C. Pulmonary thromboembolism
- D. Fibrosing alveolitis
- E. COPD

30) Characteristic feature of pulmonary hypertension does not include:

- A. Prominent a-wave in jugular venous pressure
- B. Left parasternal heave venous pulse
- C. Diastolic shock
- D. Wide splitting of S2 with loud P2
- E. Dominant R wave in leads V1 to V3

31) Hemoptysis following acute pleuritic chest pain and dyspnea is characteristic of:

- A. Bronchogenic carcinoma
- B. Pulmonary thromboembolism
- C. Pulmonary tuberculosis
- D. Arteriovenous malformations
- E. Dressler's syndrome

Answer key:

- 1- A
- 2- B
- 3- B
- 4- B
- 5- C
- 6- C
- 7- B
- 8- D
- 9- C
- 10- D
- 11- A
- 12- A
- 13- C
- 14- C
- 15- B
- 16- E
- 17- B
- 18- D
- 19- C
- 20- A
- 21- D
- 22- B
- 23- C
- 24- D
- 25- A
- 26- B
- 27- D
- 28- D
- 29- C
- 30- D
- 31- B

NEUROLOGY

Multiple Choice Questions (MCQs)

1. A 22-year-old woman presents with daily band like headaches over the past 2 weeks. The headaches seem to be more intense in the back of the head, and are often precipitated by emotional stress. Physical examination fails to disclose focal neurologic or visual deficits. **Which of the following is the most appropriate initial step in patient care?**

- A. Antidepressant drugs
- B. Calcium-channel antagonists
- C. Ergotamine-containing preparations
- D. NSAIDs
- E. Sumatriptan

The correct answer is D. The clinical features of these headaches, with their characteristic band-like quality, immediately suggest tension headaches, which are often associated with tightness of the neck muscles. Stress, fatigue, and noise may act as precipitating triggers. Exploration of underlying causes of anxiety is often useful, but a trial with aspirin or other NSAIDs may be sufficient in most cases. Tension headaches may show overlapping features with migraine.

2. An unconscious 35-year-old man is brought to the ER by his wife. She explains that the patient takes Phenytoin for chronic epilepsy. An hour ago, the patient had a seizure but did not regain consciousness. Physical examination reveals that his temperature is 38.5°C, blood pressure is 95/40 mm Hg, pulse is 110/min, and respirations are 20/min. During the examination, the physician observes the sudden onset of tonic-clonic convulsions. **Which of the following is the most common precipitating cause of this emergency?**

- A. Alcohol withdrawal
- B. Drug noncompliance
- C. Head trauma
- D. Hypoxia
- E. Intracranial infection

The correct answer is B. Status epilepticus is a life-threatening emergency that should be treated promptly. It is diagnosed when a generalized convulsive seizure lasts longer than 10 minutes or when a seizure episode is followed by another episode without recovery of consciousness. There are two types of status epilepticus: convulsive and non-convulsive. The convulsive type is the most dangerous. It can lead to metabolic and cardiovascular disturbances, including hypoxemia, hypoglycemia, hypotension, and hyperthermia, that may cause death or permanent brain damage. About 50% of patients presenting with status epilepticus do not have history of epilepsy. The most frequent precipitating factor in adults with a diagnosis of epilepsy is

drug non compliance. Alcohol withdrawal (choice A), head trauma (choice C), hypoxia (choice D), intracranial infection (choice E), intracranial tumor, and metabolic alterations are other precipitating factors for status epilepticus.

3. A 70-year-old man presents with rapid onset of right-sided weakness and confusion. On arrival, the patient is drowsy & examination confirms a right hemiparesis associated with left deviation of the eyes. The patient is admitted with a preliminary diagnosis of cerebral infarction. A scan of the head performed 12 hours following symptom onset reveals changes consistent with ischemic infarction in the territory of the middle cerebral artery. The patient's neurologic status deteriorates rapidly on the third hospital day, and he lapses into coma. He dies the next day. An autopsy confirms a large infarct in the territory of the middle cerebral artery, associated with massive swelling of the left hemisphere, and trans-tentorial herniation. **Which of the following treatments might have prevented such an outcome?**

- A. Anticoagulants
- B. Barbiturates
- C. Calcium channel blockers
- D. Corticosteroids
- E. Vasodilators

The correct answer is D. The edema (swelling) that develops around a cerebral infarct becomes particularly pronounced 48-72 hours following ischemic necrosis and may be of massive proportions if infarction is extensive. This leads to increased intracranial pressure, often resulting in cerebral herniation. Corticosteroids, such as prednisone (up to 100 mg/day) and dexamethasone (16 mg/day), are used to reduce cerebral edema following brain infarction and prevent herniation syndromes. Anticoagulants (choice A) are not used in the acute management of stroke unless there is a proven source of thrombo-emboli, such as cardiac disease (e.g., atrial fibrillation and mitral valve prolapse). Heparin is the drug of choice. Anticoagulation can be started only if intracerebral hemorrhage has been ruled out by CT.

4. A 22-year-old man is brought to ER several hours after sustaining a severe head trauma during a soccer game. He became unconscious for a short time soon after the accident, regained consciousness for 3 hours, and subsequently relapsed into coma. On arrival, the patient appears unresponsive to verbal or painful stimuli. A scalp lesion consistent with prior contusion is found in the right parietal region. The right pupil is dilated and poorly reactive to light, and funduscopic examination reveals early papilledema. **Which of the following is the most likely diagnosis?**

- A. Epidural hemorrhage
- B. Fracture without associated brain injury
- C. Intracerebral hypertensive hemorrhage
- D. Subarachnoid hemorrhage
- E. Subdural hemorrhage

The correct answer is A. The clinical presentation is highly characteristic of epidural bleeding, which usually is of traumatic origin and most often results from rupture of the middle meningeal artery. The initial concussion leads to a brief loss of consciousness, which is followed by a lucid interval lasting several hours. As the epidural hematoma progressively enlarges and pushes the underlying brain, the patient becomes comatose again and may display signs of uncal herniation. The herniating uncus pushes on the third cranial nerve, producing ipsilateral fixed pupillary dilatation. Papilledema is usually a late sign and indicates cerebral edema, subarachnoid hemorrhage (choice D) characteristically manifests with sudden onset (thunderclap) of headache associated with vomiting and progressive impairment of consciousness. The most frequent cause is rupture of berry aneurysms.

The clinical manifestations of a subdural hemorrhage (choice E) may vary depending on the severity and location. Cerebral atrophy is a predisposing condition, as it leads to "stretching" of bridging veins that connect the veins on the cerebral convexities with the superior sagittal sinus. Minimal trauma may then result in tearing of such veins. Impaired consciousness and/or focal neurologic deficits follow the traumatic event after an interval of days or weeks.

5. A 40-year-old man presents with episodes of severe vertigo accompanied by nausea and vomiting. He has now had five of these episodes over the past 6 months. The episodes frequently begin with a sense of fullness in his right ear, which is often accompanied by tinnitus and a sense of hearing loss in the affected ear. Each episode lasts hours to days and then resolves. Otoloscopic examination of the affected ear is within normal limits. Which of the following is the most likely diagnosis?

- A. Benign paroxysmal positional vertigo
- B. Herpes zoster oticus
- C. Meniere disease
- D. Purulent labyrinthitis
- E. Vestibular neuronitis

The correct answer is C. This is Meniere disease, a disease associated with attacks of vertigo, tinnitus, and initially fluctuating and later progressive hearing loss, the clinical description illustrated in the question stem is typical. Meniere disease can affect any age or sex, with a (broad) peak in the 4th and 5th decades of life. Treatment is pharmacologic and often requires some experimentation before medications (e.g., anticholinergics, antihistamines, barbiturates, and diazepam) effective in a particular individual are found. Benign paroxysmal positional vertigo (choice A) is characterized by violent vertigo induced by moving the head to certain positions.

6. A 56-year-old woman undergoes neurologic evaluation for recent onset of seizures and a gradually worsening tingling sensation in her right arm. Examination reveals mild loss of strength in the right upper extremity. CT scan and MRI show a 5-cm dural-based mass in the left frontoparietal region. The mass is well demarcated and compresses the underlying parenchyma. T1-weighted MRI scans after gadolinium enhancement show marked contrast enhancement within the lesion associated with a characteristic "dural tail;" there is prominent thickening of the overlying bone. Which of the following is the most likely diagnosis?

- A. Glioblastoma multiform (GBM)
- B. Langerhans cell Histiocytosis
- C. Meningioma
- D. Metastasis
- E. Paget disease

The correct answer is C. Meningiomas are benign neoplasms of meningotheial origin. They grow from the dura ("dural-based") toward the cerebral parenchyma, pushing without infiltrating the brain. This pushing pattern of growth, resulting in "well-demarcated" borders, is highly characteristic of any benign neoplasm. An additional MRI/CT feature pointing to meningioma is the presence of a "dural tail" following contrast enhancement. Meningioma is the most frequent of benign CNS tumors and is two times as common in women as in men. Surgical excision is usually easy when located in the cerebral convexities, rarely; meningiomas may have malignant features, invade the brain, and even result in extracranial metastasis. Meningioma frequently expands into the skull, inducing reactive bone condensation, but this is not a sign of malignancy.

7. A 24-year-old man is brought to ER after 2 days of unusual behavior. His friends report that the patient has made unwanted advances toward several women at work and that he seemed unconcerned when confronted by his boss. The ER visit was prompted by a prolonged spell during which the patient seemed "in a daze;" picking at his clothes for several minutes while a friend was trying to talk to him. In the ER, he is awake and alert but slightly disoriented. There is no meningismus. He has poor short-term memory but the neurologic examination is otherwise non focal. Vital signs are remarkable for a temperature of 38.1°C. A CT scan of the brain with and without contrast is read as normal. A lumbar puncture revealed: Opening pressure 18 cm, Glucose 80 mg/dL, Protein 75 mg/dL, and WBCs 25/mm³ with a lymphocytic predominance, RBCs 8/mm³. Which of the following is the most likely diagnosis?

- A. Bacterial meningitis
- B. Brain abscess
- C. Creutzfeldt-Jakob disease
- D. Hemorrhagic infarct
- E. Viral encephalitis

The correct answer is E. Herpes simplex virus can produce fulminant encephalitis that has a tendency to begin in the inferior frontal and medial temporal lobes. This location often leads to behavioral abnormalities as the presenting symptoms, followed by seizures that may be complex partial or generalized tonic-clonic. Imaging may be initially normal, but MRI subsequently demonstrates inflammation in the medial temporal lobes and inferior

frontal lobes. The CSF profile shows a lymphocytic pleocytosis with some evidence of hemorrhagic component. Bacterial meningitis (choice A) typically causes meningism and should show a neutrophil-predominant CSF profile with a decreased glucose. Brain abscess (choice B) typically presents with high fever, headaches, focal neurologic complaints, and seizures. A head CT with contrast should demonstrate a ring-enhancing lesion with edema and mass effect. Creutzfeldt-Jakob disease (choice C), a degenerative dementia caused by infective Prion proteins, can present with behavioral symptoms but follows a more sub-acute course. The CSF is usually unremarkable. Infarcts may rarely present with behavioral symptoms and no focal features, but a 2-day hemorrhagic infarct (choice D) would be apparent on a CT.

8. A 65-year-old man is brought to ER 30 minutes after the acute onset of headache, nausea, and sudden loss of balance. The patient is unable to stand or walk, but there is no loss of muscular strength or sensory deficits. Consciousness is preserved, and the patient is oriented to person, space, and time. He says that he had hypertension for a long time but has not taken any antihypertensive therapy. His blood pressure is now 165/100 mm Hg, and his pulse is 65/min. A CT scan of the head reveals an acute intracranial hematoma. Which of the following is the most likely location of the hematoma?

- A. Cerebellum
- B. Cerebral white matter
- C. Epidural space
- D. Pons
- E. Putamen

The correct answer is A. Among hypertensive intracerebral bleeds, cerebellar hematomas merit special consideration. A hematoma within a cerebellar hemisphere manifests with sudden onset of headache and ataxia in an otherwise lucid patient. This highly characteristic presentation warrants immediate medical attention because of the possibility of full recovery if properly treated. An intra-cerebral hematoma in the cerebral white matter (choice B) is usually accompanied by lateralized motor and/or sensory deficits. Epidural hemorrhage (choice C) is always of traumatic origin and manifests with the characteristic talk-and-die syndrome. There is a lucid interval between trauma and coma. Following hemorrhages in the pons (choice D), the patient falls into immediate coma with quadriplegia and usually dies of cardiorespiratory arrest. The putamen (choice E) is the most frequent site of hypertensive bleeding. Putaminal hemorrhage usually involves the adjacent internal capsule, leading to contralateral hemiparesis, hemi anesthesia, and hemianopia.

9. An 18-year-old girl presents with a 2 days of progressive left-sided facial weakness. On physical examination, a left facial droop is noted. Vesicular eruptions are seen in the left external auditory canal, as well as on the left side of the pharynx. Which of the following is the most likely diagnosis?

- A. Bell palsy
- B. Guillain-Barre syndrome
- C. Horner syndrome
- D. Meniere disease
- E. Ramsay Hunt syndrome

The correct answer is E. This question asks you to differentiate between different types of peripheral motor neuropathies. Ramsay Hunt syndrome, which is caused by herpes zoster infection of the geniculate ganglion, results in facial palsy. It differs from the other neuropathies in that there is usually a vesicular eruption, typical of herpes infections. Bell palsy (choice A), the most common form of facial paralysis, is idiopathic. The onset is abrupt, with maximal weakness in the first 48 hours. Eighty percent of patients fully recover in a few weeks. Guillain-Barre syndrome (choice B) is an acute inflammatory polyradiculoneuropathy. It causes bilateral facial palsy and usually produces areflexic motor paralysis. A viral illness often precedes the onset of neuropathy. Horner syndrome (choice C) affects the oculo sympathetic nerves, usually ipsilaterally, specifically causing unilateral miosis and ptosis, with normal pupillary response to light. Hemi anhidrosis of the face also occurs. Meniere disease (choice D) manifests with recurrent vertigo and is associated with tinnitus and progressive deafness. There is facial paralysis.

10. A 33-year-old woman complains of diplopia in the early evening every day for the past month, which resolves following sleep. She also complains of jaw weakness after eating large meals. She has no significant past medical history. Physical examination is normal, except repeated blinking elicits a ptosis that resolves following the administration of IV edrophonium. Which of the following is the most likely diagnosis?

- A. Botulism
- B. Eaton-Lambert syndrome
- C. Guillain-Barré syndrome
- D. Multiple sclerosis
- E. Myasthenia gravis

The correct answer is E. Myasthenia gravis is an autoimmune disease caused by circulating antibodies that bind to acetylcholine receptors on the postsynaptic membrane. The disease is characterized by weakness and fatigue. The weakness usually begins in the extraocular muscles with ptosis and diplopia. The symptoms may be localized to the ocular muscles or generalized. The weakness usually becomes more prominent toward the end of the day or following continuous use of affected muscles. Other bulbar muscles may be involved, causing difficulty in swallowing, chewing, or speaking. Closing the eyes or relaxing makes the symptoms disappear. Ocular weakness can be induced with repetitive blinking, with the patient developing ptosis. Administration of edrophonium causes a transient resolution of symptoms.

11. A 62-year-old man with a long history of cigarette smoking complaining of a drooping right eyelid. The patient denies headache or weight loss. He complains of an occasionally productive cough but is otherwise in good health. Examination shows right ptosis and a small pupil. Extraocular movements and visual acuity are normal. The right side of his face appears warm and dry. Which of the following is the most appropriate step in diagnosis?

- A. Chest x-ray examination
- B. Laboratory testing for syphilis
- C. MRI scan of the head
- D. Ophthalmologic referral
- E. Tonometric measurement

The correct answer is A. This patient is exhibiting the signs of Horner syndrome, resulting from damage to the cervical sympathetic plexus that contains presynaptic fibers to the superior cervical ganglion. This results in deficient sympathetic innervation to the iris and the tarsal muscles of the eye, as well as to the sweat glands and vessels in the ipsilateral face. This deficit leads to miosis and ptosis in the ipsilateral eye, and anhidrosis and redness of the ipsilateral hemi face. The most common cause of this syndrome is pulmonary cancer of the apex, which may spread to the sympathetic plexus by contiguity. A patient presenting with Horner syndrome, especially if a smoker, should undergo radiologic investigations to exclude a lung tumor.

12. A 55-year-old woman with hypertension presents with 3 weeks of worsening headaches and language difficulty. She reports severe headaches that waken her from sleep and are worse in the morning, frequently associated with nausea. She complains of slowness of speech and difficulty with word-finding. She is afebrile. A neurologic examination is remarkable for slow, effortful speech with poor repetition, and a right pronator drift. An urgent MRI study shows a diffusely enhancing intra-axial abnormality in the left frontal region. Which of the following is the most likely diagnosis?

- A. Astrocytoma
- B. Brain abscess
- C. Cerebral infarct
- D. Complicated migraine
- E. Meningioma

The correct answer is A. Astrocytoma typically presents in the 40- to 60-year age range with headaches, focal neurologic symptoms, and seizures. Headaches from tumors may awaken patients from sleep and are worse in the morning, presumably from increased intracranial pressure after being supine over night. High-grade astrocytomas tend to enhance diffusely on imaging.

13. A 27-year-old woman complaining of severe headache that has been present for approximately 4 months and has been increasing in severity. The headache is constant, is worse in the mornings, and the patient points to the center of her head to describe its location. For the past 3 weeks, she has also experienced blurred vision and forceful vomiting. When examined now she is somewhat obtunded and she has bilateral papilledema, but her neurologic examination shows no focal findings. She has no history of recent head trauma. Which of the following diagnostic tests is most likely to provide the diagnosis?

- A. MRI of the head
- B. Skull x-rays
- C. Spinal tap
- D. Urinary catecholamines
- E. Visual fields

The correct answer is A. The young woman has a brain tumor. MRI will provide the best diagnostic images. Skull x-rays (choice B) rarely are used nowadays. When patients sustain head trauma, CT scan is much more valuable. When we suspect brain tumor, x-rays are completely worthless. They cannot penetrate past the bone to show the brain. Spinal tap (choice C) is absolutely contraindicated. The patient has increased intracranial pressure. A tap might produce herniation and death.

14. A 35-year-old man has had nocturnal attacks of severe periorbital headache for the past 5 days. Each episode awakens him at night within 2 hours of falling asleep, lasts for less than an hour, and is associated with ipsilateral rhinorrhea and lacrimation. There is no family history of similar headaches. Careful evaluation does not reveal any objective evidence of neurologic dysfunction. The pupils are equal and normally reactive to light. His temperature is 37°C, blood pressure is 125/75 mm Hg, and pulse is 72/mm. Which of the following is the most likely diagnosis?

- A. Cluster headache
- B. Depression headache
- C. Giant cell arteritis
- D. Migraine
- E. Tension headache

The correct answer is A. The clinical presentation is characteristic of cluster headache. In its classic form, cluster headache manifests as nocturnal attacks that last between 30 minutes and 2 hours. These are often precipitated by alcohol consumption and recur daily for up to 8 weeks. Each "cluster" is then followed by a pain-free interval lasting for 1 year on average. The pathogenesis is probably related to disturbances of the serotonergic pathways originating from the raphe nuclei. Acute attacks may be shortened by oxygen, sumatriptan, and ergotamine preparations; several prophylactic agents are available to prevent clusters. Depression headache (choice B) is often worse in the morning and is frequently associated with other manifestations of depression. The headache due to giant cell arteritis (choice C) usually manifests in elderly patients and is associated with scalp tenderness over the affected superficial temporal artery. Systemic signs and symptoms are present, including myalgia, weight loss, and malaise.

The erythrocyte sedimentation rate is elevated. Classic cases of migraine (choice D) begin in early adulthood and manifest as episodic unilateral throbbing headache, often associated with nausea, photophobia, and visual symptoms. Tension headache (choice E) has a diffuse, band-like character and feels worse in the back of the head. Pain slowly increases and may last for many hours or even days.

15. A 52-year-old man complaining of slowly progressive weakness in his legs. He also complains of clumsiness with his right hand, which creates difficulties with buttons or turning keys. Examination reveals mild bilateral foot drop and leg weakness. Fasciculation and mild wasting are observed in the calf muscles. There is no spasticity or impaired sensation. The speech is normal, but fasciculation of the tongue is appreciated. Respiration, pulse, and temperature are normal. A muscle biopsy shows evidence of denervation with re innervation. Which of the following is the most likely diagnosis?

A. Amyotrophic lateral sclerosis (ALS)
 B. Guillain-Barré syndrome
 C. Myasthenia gravis
 D. Peroneal muscular atrophy.
 E. Spinal muscular atrophy

The correct answer is A. Flaccid paresis involving the lower extremities, foot drop, hand clumsiness, muscle wasting, and especially fasciculation in a middle-aged person are highly suggestive of amyotrophic lateral sclerosis (ALS). This results from degeneration of the motor neurons in the spinal cord (lower motor neuron) and leads to denervation of skeletal muscle. His tongue fasciculation result from degeneration of motor neurons of cranial nerve nuclei (XI) continued bulbar involvement will likely eventually affect pharyngeal and facial musculature leading to progressive dysarthria and dysphasia.

Surviving neurons may re innervate denervated myo fibers by sprouting of their axons. The finding of denervation re innervation in a muscle biopsy is confirmatory of the clinical diagnosis. The patient will later develop evidence of corticospinal and cortico-bulbar (upper motor neuron) degeneration as his disease progresses. Guillain-Barré syndrome (choice B) manifests with ascending paralysis (first the lower, then the upper extremities are involved) and results from a chronic inflammatory response leading to demyelination of peripheral nerves. It is often preceded by an upper respiratory tract infection. Myasthenia gravis (choice C) is characterized by fluctuation muscle weakness that usually begins in the ocular muscles, resulting in diplopia and ptosis. Since the disorder is due to impaired cholinergic transmission at the neuromuscular junction, skeletal muscle biopsy is within normal limits at the light microscopic level. Peroneal muscular atrophy (choice D) is an autosomal recessive demyelinating disease of peripheral nerve that manifests in children or young adults with marked atrophy of the calf muscles and distal muscle weakness. Spinal muscular atrophy SMA (choice E) is the infantile counterpart of ALS.

16. A 71-year-old man presents with acute onset of headache, vomiting, and confusion. The family reports that he has a long history of poorly controlled hypertension with hypertensive renal disease and eye disease that were diagnosed 3 years ago. They report that, a few hours ago, he rapidly developed a very severe headache, and over the next half hour, became more lethargic and confused, and had five episodes of vomiting. His blood pressure is 235/140 mm Hg in both arms, and he appears to have a lateral gaze paralysis on the right. There is no nuchal rigidity, and the pupils appear reactive bilaterally; however, papilledema is evident on fundoscopic exam. Which of the following is the most likely diagnosis?

A. Cerebellar hemorrhage
 B. Epidural hematoma
 C. Putaminal hemorrhage
 D. Subarachnoid hemorrhage
 E. Subdural hematoma

The correct answer is C. This patient is having a hypertensive hemorrhage. The caudate and the putamen are the most common sites for such bleeds (70%), which can lead to dangerous elevations in intracranial pressure (ICP), as in this patient. The signs and symptoms of increased ICP, when present, portend imminent herniation of the brain and certain death. These patients require urgent intervention to lower their blood pressure.

The cerebellum (choice A) is an uncommon site (<5%) for hypertensive hemorrhage. When cerebellar hemorrhages occur, urgent intervention is required because they can cause brainstem compression and/or obstructive hydrocephalus. Epidural hematoma (choice B) is usually the result of trauma to the squamous portion of the temporal bone of the skull and is not associated with hypertension.

Subarachnoid hemorrhage SAH (choice D) is infrequently associated with severe hypertension and is usually accompanied by meningismus. Once the SAH is identified, neurosurgical intervention to stop the bleeding can be performed, and the patient thereafter has a normal life expectancy. The most common nontraumatic cause for SAH is a berry aneurysm in the anterior portion of the circle of Willis. Subdural hematoma (choice E) results from tearing of the bridging subdural veins, most often due to trauma or shearing forces. It is uncommon without trauma and, even when present, does not tend to produce headache and increased ICP unless very severe.

17. A 40-year-old man complaining of dizziness. The patient has noticed that every time, he lays with the right side of his head down, he develops a spinning sensation within a few seconds. This symptom will last as long as the position is maintained, but resolves when a new head position is taken. He does not experience tinnitus or hearing changes during these episodes. Otoloscopic examination is within normal limits. Which of the following is the most likely diagnosis?

A. Benign paroxysmal positional vertigo
 B. Cholesteatoma
 C. Herpes zoster oticus
 D. Meniere disease
 E. Presbycusis

The correct answer is A. This patient has benign paroxysmal positional vertigo.

Patients should be instructed to avoid the position that sets off the vertigo. A repositioning maneuver is effective in most cases, but chronic cases may require surgical treatment. Some cases resolve spontaneously within a year. Cholesteatoma (choice B) is a tumor like, benign lesion that can destroy the middle ear and occurs in the setting of chronic otitis media.

Herpes zoster oticus (choice C), or herpes infection of the ganglion of CN V I, causes severe ear pain, vertigo, hearing loss, and sometimes facial nerve paralysis. Meniere disease (choice D) causes the cluster of vertigo, tinnitus, and fluctuating hearing loss, but is usually not triggered by positional changes.

Presbycusis (choice E) is a progressive loss of sensitivity to high frequencies with age.

18. A healthy 20-year-old man presents with a history of recurrent episodes of severe throbbing headache. The headaches are triggered or aggravated by noise and stress and last for several hours. The pain is frequently preceded by visual disturbances, such as luminous stars or zigzags of light, and accompanied by nausea and vomiting. His father experienced a similar form of headache. The patient has found no relief with aspirin and ibuprofen. Which of the following is the most appropriate drug treatment during the acute attacks?

- A. Acetaminophen
- B. Calcium-channel antagonists
- C. Carbamazepine
- D. Ergotamine
- E. Prednisone

The correct answer is D. The clinical picture is virtually pathognomonic of migraine, especially considering the premonitory visual symptoms (the aura), the throbbing quality of the pain, and the positive family history. However, migraine does not always present classically. A common form of migraine may be more frequent, with diffuse (not unilateral) throbbing pain of moderate intensity which is not preceded by visual disturbances or associated with nausea. Acute treatment is based on the administration of anti migraine drugs at the onset of symptoms. Effective drugs include ergotamine tartrate or similar compounds, and sumatriptan. Prophylactic treatment is aimed at decreasing the frequency of attacks. Calcium channel blockers (choice B), for example, have been used for prophylaxis. Acetaminophen (choice A) is very unlikely to provide relief in classic migraine, especially if aspirin and ibuprofen have already failed to do so.

19. An 82-year-old woman complaining of repeated falls without apparent cause. The patient reports that she fell to the ground because of a sudden loss of strength in her legs without losing consciousness or feeling dizzy. She lay on the floor for a few minutes until she recovered strength and became able to stand up and walk again.

Examination reveals mild resting tremor of her hands, but there is no rigidity or slowing of movements. Her blood pressure is 125/80 mm Hg, pulse is 68/min and regular, and respirations are 13/min. On auscultation, a bruit is heard over the right carotid artery. Which of the following is the most likely cause of this patient's falls?

- A. Lateral medullary infarction
- B. Parkinson disease
- C. Postural hypotension
- D. Transient ischemia in the carotid territory
- E. Transient vertebrobasilar ischemia

The correct answer is E. The clinical symptomatology is strongly suggestive of "drop attacks" resulting from transient ischemia in the vertebrobasilar territory. Ischemia of the pyramidal tract in the brainstem is the most probable pathogenetic mechanism. Transient ischemic attacks (TIM), by definition, last less than 24 hours (usually less than 1 hour). TIA is often a harbinger of stroke, especially when involving the carotid circulation.

Lateral medullary infarction (choice A) follows occlusion of the vertebral or posterior inferior cerebellar artery. Its manifestations include ataxia, vertigo, nystagmus, impaired pain and temperature sensation on the ipsilateral face and contralateral body, dysphagia, and hoarseness. Postural hypotension (choice C) is a frequent cause of falls in the elderly and is often the result of medication. Typically, the patient reports a light-headed sensation on standing or getting up from bed, and the fall may be accompanied by a transiently obtunded consciousness. The carotid bruit in this case is probably secondary to atherosclerotic stenosis of the carotid artery but not to the patient's symptoms. Transient ischemia in the carotid territory (choice D) manifests with motor deficits, sensory symptoms, or alterations in language expression or comprehension (aphasia).

20. A 32-year-old female presents with headaches. She has a severe frontal and occipital headache which is present as soon as she wakes in the mornings. She had given birth to a baby boy one month ago and has not been feeling well since. Examination revealed bilateral blurring of the optic discs with pupil sparing 3rd nerve palsy on the right. What is the most likely diagnosis?

- A. Brainstem Cerebro vascular Stroke
- B. Herpes simplex encephalitis
- C. Meningococcal meningitis
- D. Sagittal sinus thrombosis
- E. Sphenoidal wing meningioma

The correct answer is D. Patients with a hypercoagulable state (pregnancy) and papilledema with neurological signs should be investigated for cerebral venous thrombosis. Patients may present with a seizure or hysteria and may be mistaken for a psychiatric disorder. Cranial nerve 3, 4 and 6 involvements suggest a cavernous sinus thrombosis. Isolated cortical venous sinus thrombosis may give rise to focal neurology. The diagnosis is made by MRI, and the condition may be underdiagnosed

21. A 16 year-old boy presents with rapidly progressive weakness over three days, which is ascending from his lower limbs upwards, associated with areflexia but no sensory loss or bladder disturbances. Which one of the following is the most appropriate treatment?

- A. Azathioprine
- B. Cyclosporin
- C. Immunoglobulin
- D. Methotrexate
- E. Methylprednisolone

The correct answer is C. Randomized controlled trials have shown that human immunoglobulins and plasma exchange improve outcome in Guillain-Barre Syndrome (GBS). Other immunosuppressive treatment does not have a role in the treatment of GBS

22. A teenage girl presents with rapidly progressive weakness over three days, which is ascending from her lower limbs upwards, associated with areflexia but no sensory loss or bladder disturbances. Her weakness continues to worsen after admission to hospital. Which of the following should be used to monitor her?

- A. Arterial blood gases
- B. Chest expansion size
- C. FEV1/FVC ratio
- D. PEFR
- E. Vital capacity

The correct answer is B. This is the best way to monitor respiratory function in any neurological disorders that can affect the respiratory muscles (e.g. GBS, Myasthenia gravis).

23. A 70-year-old female patient presents with 2 months history of apathy, withdrawal, urinary and faecal incontinence and anosmia. What is the most likely anatomical site of the neurological lesion?

- A. Frontal lobe
- B. Internal capsule
- C. Occipital lobe
- D. Parietal lobe
- E. Temporal lobe

The correct answer is A. Frontal lobe syndrome usually presents with personality changes, urinary and faecal incontinence, anosmia, expressive dysphasia (dominant lobe), release of primitive reflexes and epilepsy (50%) of patients presenting with status epilepticus (with no previous history of seizures) have frontal lobe tumor. It can mimic dementia

24. A 48-year-old man presented with a two week history of recurrent severe right-sided peri-orbital headache, frequently nocturnal and occurring at least once daily, usually lasting an hour. He had noticed lacrimation from the right eye and blockage of the right nostril during the headache. At the time of the examination he was free from headache and there were no abnormal physical signs. Which of the following is the most likely diagnosis?

- A. Cluster headache
- B. Intracranial aneurysm
- C. Orbital pseudotumor
- D. Right maxillary sinusitis
- E. Trigeminal neuralgia

The correct answer is A. Cluster headaches are commoner in men (M: F 10:1). They are usually presents nocturnally and in early morning. They are paroxysmal (occur in clusters). They are associated with autonomic symptoms: lacrimation, ptosis, pupil constriction, nasal congestion, redness of eye, swelling of eyelid. Examination between the attacks is normal

25. A 47-year-old diabetic patient complaining of dizziness and vomiting. On examination he is alert and oriented; his pulse is 80 irregularly irregular and BP 160/90 mmHg. There is nystagmus on left lateral gaze and his speech is slurred. On examination of the limbs there was intention tremor and past pointing. He is ataxic when mobilized. What is the likely diagnosis?

- A. Brainstem infarction.
- B. Cerebellar CVA
- C. Meniere's disease
- D. Sub-acute combined degeneration of the cord
- E. Viral labyrinthitis

The correct answer is B. This man has a history of vertigo and the clinical signs of nystagmus. Slurred speech, intention tremor and past pointing, as well as ataxia, suggest the cerebellum as the site of injury. This man also has risk factors for cerebrovascular disease including atrial fibrillation, diabetes and hypertension. Labyrinthitis does not produce cerebellar signs despite being associated with nystagmus. Subacute combined degeneration of the cord is associated with posterior column signs, loss of vibration sensation and a positive Romberg's test. Brainstem signs would be expected with a brainstem CVA and impaired conscious level

26. A 35-year-old man has wrist drop of his right hand. Examination reveals a small area of sensory loss on the dorsum of the hand. Which of the following nerves is likely to be involved?

- A. Long thoracic nerve
- B. Median nerve
- C. Radial nerve
- D. T1 nerve root
- E. Ulnar nerve

The correct answer is C. This is typical radial nerve palsy

27. A 55-year-old man has progressive weakness of his hands over a period of 1 year. Examination reveals wasting of the muscles of the hands and forearms and fasciculation. There is hyperreflexia of his lower limbs and upgoing planter reflexes. Sensation is normal. Which of the following is the most likely diagnosis?

- A. Alzheimer's disease
- B. Motor Neurone Disease
- C. Multiple Cerebral Infarcts
- D. Multiple Sclerosis
- E. Syringomyelia

The correct answer is B. There is a mixture of lower motor neurone signs in the upper arms and upper motor neurone signs in the legs. Cerebrovascular disease and Alzheimer's disease are therefore unlikely. The history is of gradual onset over 1 year which makes Multiple sclerosis less likely since it is usually abrupt in the onset of symptoms. Syringomyelia is unlikely since sensation is unaffected. This leaves Motor Neurone Disease particularly of the Amyotrophic Lateral Sclerosis type.

28. A 69 year-old male presents with cognitive impairment and a diagnosis of Alzheimer disease is suspected. What is the most appropriate test of short-term memory?

- A. Assessing orientation in time
- B. Assessing serial of 7s
- C. Knowledge of the capital of Egypt
- D. Providing their home address
- E. Recall of the doctor's name at the end of the consultation

The correct answer is E. Short-term memory impairment is the commonest clinical presentation of Alzheimer's disease. Usually patients are fully orientated in time, person and place. Long-term memory is usually intact. The best way to test short-term memory is to ask the patient to recall new information in the next few minutes

29. A 60 year-old male who had been admitted a month ago with a left hemiparesis due to a right thalamic infarction presents with painful subluxation of his left shoulder. Two weeks later he develops severe, constant burning left shoulder pain which radiates down his arm. He found no relief from paracetamol. Which of the following is most likely to relieve his pain?

- A. Depo medrone injection into the shoulder
- B. Diclofenac
- C. Dihydrocodeine
- D. Gabapentin
- E. Tramadol

The correct answer is D. The description of the pain (burning, radiating) supports the diagnosis of neuropathic pain. Thalamic infarcts commonly cause late-onset of severe neuropathic pain weeks to months after the stroke. The pain is intractable to analgesics. The treatment of choice for neuropathic pain is amitriptyline/gabapentin.

30. A 24-year-old man presents with a headache that has been present for nine months. He has headache almost every day, mainly frontal, sometimes with nausea. Current medication includes paracetamol, Indomethacin and codeine with only transient relief of symptoms. He has a history of depression. Examination was normal. What is the most likely diagnosis?

- A. Analgesic misuse headache
- B. Cluster headache
- C. Frontal brain tumor
- D. Headache due to depression
- E. Migraine

The correct answer is A. This is one of the commonest causes of chronic daily headache (the commonest is chronic tension type headache). It is commonly caused by the chronic use of analgesics such as codeine phosphate and paracetamol). Treatment consists of reducing the amount of analgesics gradually until stopped

31. A 25 year-old lady recently diagnosed with rheumatoid arthritis developed weakness, double vision and tiredness. Examination reveals bilateral weakness of eye abduction, bilateral ptosis, slightly reduced proximal motor power in the limbs, normal reflexes and sensation. What is your diagnosis?

- A. Chronic progressive external ophthalmoplegia.
- B. Guillain-Barre syndrome.
- C. Multiple sclerosis.
- D. Myasthenia gravis.
- E. Polymyositis

The correct answer is D. Myasthenia gravis is well known to be associated with other autoimmune diseases such as pernicious anaemia, thyroid disease and rheumatoid arthritis. In Guillain-Barre syndrome you will expect absent reflexes. Polymyositis

does not usually cause ptosis or ophthalmoplegia

32. A 32-year-old woman, who is on the combined oral contraceptive pill and who is a smoker, presents with a history of pain and swelling in her right calf, starting two days earlier. On the morning of admission, she developed sudden onset of weakness on her right side. On examination she has hemiplegia, with weakness of her right hand and upper motor neuron signs. There is evidence of a deep vein thrombosis of her left calf. What is the most likely diagnosis?

- A. Berry aneurysm
- B. Cerebral tumor with hypercoagulable state
- C. Hemorrhagic stroke
- D. Paradoxical embolism
- E. Pulmonary embolism

The correct answer is D. This patient has a history suggestive of deep vein thrombosis with calf pain and swelling and the risk of the combined oral contraceptive pill. She then develops pleuritic pain suggestive of embolization.

The sudden onset of a right sided hemiplegia suggests that the embolus whilst passing through the heart has paradoxically crossed via an ASD or VSD to the systemic side of the circulation giving rise to an embolic CVA.

33. A 16 year-old male presents with a five year history of absence seizures with three recent generalized convulsions. Which one of the following drugs, given as monotherapy, is most likely to control his fits?

- A. Clonazepam
- B. Ethosuximide
- C. Gabapentin
- D. Sodium Valproate
- E. Topiramate

The correct answer is D. Absences, generalized tonic clonic seizures and myoclonus are features of primary generalized epilepsy. The treatment of choice includes sodium valproate, lamotrigine and topiramate. Clonazepam is useful in myoclonus, ethosuximide in isolated absences and gabapentin in partial seizures. Valproate would be the most appropriate first line agent

34. A 60-year-old man presents after a fall in his bathroom. His wife felt that he was transiently confused. On examination, he was alert, and no abnormalities were noted. He is hypertensive on bendroflumethiazide 2.5 mg daily. He was discharged without any further intervention. Two weeks later, the confusion state has returned. Examination reveals a temperature of 36.7°C, a pulse rate of 84 bpm regular, blood pressure of 150/95 mm Hg. He is slightly slowed, being disoriented to time with some deficit in recent memory. The patient moves slowly, but power is normal. Neurologic examination shows slight hyperactivity of the tendon reflexes on the right with unclear planter responses because of bilateral withdrawal. Which of the following would you request?

- A. 24 hour ambulatory electrocardiogram
- B. CSF analysis
- C. CT of the head
- D. EEG
- E. Electromyography and nerve conduction testing

The correct answer is C. This patient probably has evidence of a right sided hemiparesis and together with the history of confusion and previous head injury a diagnosis of subdural hematoma should be suspected. Consequently the most appropriate investigation would be CT head scan. Particularly in the presence of focal neurology, a CT scan should be performed before embarking upon an LP.

35. A 27-year-old man presents with a two years history of intermittent tingling sensation involving his left side. It starts in his fingers and spreads in 10-20 seconds to affect the whole arm and leg on the same side. The attacks only last for one minute. What is the most likely diagnosis?

- A. Hyperventilation
- B. Migraine with aura
- C. Multiple sclerosis
- D. Somatosensory seizures
- E. Transient ischemic attacks

The correct answer is D. Positive symptoms (jerking, tingling) usually signify epilepsy. Negative symptoms (weakness, numbness) are usually caused by transient focal ischemia. Spread of symptoms ('marching') indicates migraine (in 5-20 minutes) or seizures (in seconds). The usual source of somatosensory seizures is the parietal lobe

36. A 52-year-old man has a slurring of his speech. Examination reveals bilateral partial ptosis and frontal balding, and difficulty releasing his grip after shaking hands. What is the most likely diagnosis?

- A. Duchenne muscular dystrophy
- B. Eaton-Lambert syndrome
- C. myasthenia gravis
- D. Myotonia atrophica
- E. Myotonia congenital

The correct answer is D. Myotonia atrophica is autosomal dominant. Its features include ptosis, frontal balding, cataracts, cardiomyopathy, impaired intellect, testicular atrophy, diabetes mellitus and slurred speech (from tongue and pharyngeal myotonia). There is no treatment for weakness which is the main cause of disability, but Phenytoin, quinine or procainamide may be useful for myotonia. Myotonia congenital (Thomsen's disease) is not associated with features of myotonia dystrophica apart from difficulty relaxing after forceful contraction.

37. A 28-year-old female had double vision for the past several days and generalized muscle weakness. She had noticed that the weakness was particularly bad in the evenings and she was struggling to keep her eyes open. She had also noticed some shortness of breath. She had type 1 diabetes and took regular insulin injections. She was a smoker of 10 cigarettes per day and did not drink any alcohol. On examination she was noted to have bilateral ptosis and nasal speech. Her blood pressure was 135/85 mmHg, pulse was 67/min and regular and oxygen saturation was 92% on room air. R.R was 10/min and chest expansion was 4cm. Her forced vital capacity was 1.23L. Cranial nerve examination revealed oculo-paresis on the right capacity was 1.23L. Cranial nerve examination revealed oculo-paresis on the right lateral rectus and there was facial muscle weakness. Neck flexion and extension were both weak. Upper limb examination revealed proximal weakness, which was fatiguable, but tone, power, reflexes and sensation all appeared normal. Lower limb examination revealed proximal weakness, normal tone but diminished ankle jerks with some evidence of impaired pinprick sensation of both feet. A short Tensilon test was positive and a plain chest x-ray showed thymic enlargement. Blood tests showed:

Acetylcholine antibodies	Negative
MuSK antibodies	Positive
Fasting plasma glucose	280 mg/dl

She was commenced on pyridostigmine 60mg QDS; however her breathing and forced vital capacity deteriorated further and was transferred to the intensive care unit. What should be the next management step?

- Arrange emergency thymectomy
- Arrange plasmapheresis
- Commence on azathioprine
- Commence on Neostigmine
- Increase the dose of pyridostigmine

The correct answer is B. The diagnosis is a myasthenic crisis. The patient has marked respiratory weakness with reduced breath count, reduced oxygen saturation, chest expansion and forced vital capacity. The treatment of choice is intravenous immunoglobulin or plasma exchange and transfer to intensive care. This patient does have thymic enlargement and will subsequently require thymectomy. Given the poor respiratory capacity, however, she requires stabilization first. 3, 4-DAP is a treatment used in Eaton Lambert syndrome, which is not the diagnosis in this case. Prednisolone, Azathioprine and Cyclosporin are treatments used in myasthenia gravis, but their action is slow and with steroids there can be deterioration in the patient's condition before an improvement is seen.

38. A 25 year-old man presents with 24 hours blurred vision in left eye and mild frontal headache. He has a 10 year history of Diabetes Mellitus. Examination reveals a central scotoma. What is your diagnosis?

- Central retinal artery occlusion.
- Diabetic retinopathy.
- Migraine.
- Optic neuritis.
- Pituitary tumor.

The correct answer is D. Optic neuritis typically presents with unilateral painful visual impairment in young people. Central scotoma is the typical visual defect of optic neuritis. Diabetic neuropathy, migraine and central retinal artery occlusion do not cause central scotoma.

39. A 25 year-old male presents with an eight week history of difficulty walking. On examination he had increased tone and pyramidal weakness of the right leg. There was impairment of pinprick sensation in the left leg up to the groin. Which one of the following is the cause of these signs?

- A central cauda equina lesion
- A cervical spinal cord lesion
- A lesion at the foramen magnum
- A right sided thoracic spinal cord lesion
- Bilateral cerebral hemisphere lesions

The correct answer is D. The clinical features suggests Brown Sequard syndrome. A hemi-cord lesion causes it. Ipsilateral signs include pyramidal weakness and dorsal column dysfunction (joint position and light touch) and contralateral signs include spinothalamic dysfunction (pinprick and temperature). Causes include trauma, tumors, and multiple sclerosis).

40. A 36-year-old male patient with a long history of relapsing-remitting multiple sclerosis, develops double vision. On examination of his eye movements, abduction of either eye elicits nystagmus in that eye. Adduction is impaired in both eyes. On MRI scanning. Where will a new white matter lesion probably evident?

- Cerebellum
- Cingulate gyrus
- Medial longitudinal bundle
- Optic chiasma
- Parietal lobes

The correct answer is C. Impairment of adduction in both eyes signifies an internuclear ophthalmoplegia. This is often accompanied by nystagmus of the abducting eye. The area of the brain affected is the medial longitudinal bundle in the brain stem which connects the third and sixth nerve nuclei. The main causes of internuclear ophthalmoplegia are multiple sclerosis, tumor of the brainstem (glioma, for example), brainstem vascular lesions, or Wernicke's encephalopathy

41. A 63-year-old male is admitted with acute onset unsteadiness of gait, dizziness and dysphagia. Examination revealed a right-sided Horner's syndrome, nystagmus, loss of pain and temperature sensation on the left side of the trunk and in the left arm and leg, and gait ataxia. What is the most likely diagnosis?

- A. Leaking posterior communicating artery aneurysm
- B. left sided acoustic neuroma
- C. Posterior inferior cerebellar artery occlusion
- D. Right sided pontine infarct
- E. Spontaneous left sided cerebellar hemorrhage

The correct answer is C. This is Wallenberg's syndrome/ lateral medullary syndrome and is due to occlusion of the posterior inferior cerebellar artery.

42. A 50 year-old male epileptic presents with Paraesthesia of hands and feet. He also has unsteadiness when walking. On examination he has Dupuytren's contracture in his left hand, a peripheral sensory neuropathy and palpable lymph nodes in his neck and axillae. Which of the following drugs is the most likely cause of these features?

- A. Carbamazepine.
- B. Clonazepam
- C. Lamotrigine.
- D. Phenytoin.
- E. Sodium valproate.

The correct answer is D. Phenytoin is well known to cause neurological side effects such as peripheral sensory neuropathy and cerebellar ataxia. Other side effects include gingival hypertrophy, lymphadenopathy hypocalcaemia, and hirsutism.

43. A 63 year-old man presents with a three month history of tremor affecting his left arm. He had suffered from a depressive psychosis for 10 years for which he had received intermittent Chlorpromazine and Amitriptyline but had not taken any therapy for the last 4 months. He describes that his two brothers also had tremors. On examination, he had a resting tremor of his left hand, with cogwheel rigidity of that arm and he had a mild generalized bradykinesia. What is the most likely diagnosis?

- A. Benign essential tremor
- B. Drug-induced Parkinsonism
- C. Idiopathic Parkinson's disease
- D. Multiple system atrophy
- E. Wilson's disease

The correct answer is C. The most likely diagnosis is idiopathic Parkinson's disease due to the fact that the symptoms and signs are present only on the right side. Neuroleptic induced Parkinsonism is usually bilateral and symmetrical. Essential tremor does not cause rest tremor (it usually causes bilateral postural and action tremor)

44. A 62-year-old male is noted to have a broad-based ataxic gait. What is the most likely cause?

- A. A basal ganglia lesion
- B. Cerebellar infarction
- C. Osteomalacia
- D. Phenytoin toxicity
- E. Right-sided cerebral infarction

The correct answer is B. Broad based gait is associated with cerebellar syndrome. However, lesions of cerebellar vermis cause truncal ataxia and tendency to fall backwards. Right-sided cerebral infarction is associated with a hemiplegic gait. Basal ganglia disease causes extrapyramidal signs with Parkinsonism (festinant gait, Marche a petit pas). Proximal myopathy causes a waddling gait.

45. A 55 year-old man presents with a resting tremor of his right arm and a diagnosis of idiopathic Parkinson's disease is made. Which one of the following drugs is most likely to help his tremor?

- A. Amantadine
- B. Benzhexol
- C. Cabergoline
- D. Co-Carpi-L dopa
- E. Selegiline

The correct answer is B. Anticholinergic treatment (e.g. benzhexol) is the treatment of choice of tremor predominantly Parkinson's disease. L-dopa and dopamine agonists are the treatment of choice for bradykinesia and rigidity.

46. A young woman who has suffered from cerebral venous sinus thrombosis associated with pregnancy. What is the most likely period during which she suffered this event?

- A. During labour
- B. In the 1st trimester
- C. In the 2nd trimester
- D. In the 3rd trimester
- E. In the postpartum period

The correct answer is E. Venous Sinus Thrombosis is associated with the oral contraceptive pill, the post partum period and other hypercoagulable states. The clinical signs include papilledema, cranial nerves I, IV and VI compromise, ocular chemosis and proptosis.

47. A 65 year-old woman with 12 hour history of unsteady gait of sudden onset associated with vomiting and headache. Following this she had increasing drowsiness. What is your diagnosis?

A. Acute subdural hemorrhage
 B. Cerebellar hemorrhage.
 C. Frontal subdural empyema
 D. Herpes simplex encephalitis.
 E. Pituitary apoplexy.

The correct answer is B. The history is very typical of cerebellar hemorrhage. The drowsiness suggests the presence of hydrocephalus, a common complication of cerebellar hemorrhage.

48. A 24-year-old man presents with a five month history of low back pain, radiating to his buttocks, and back stiffness worse in the morning and worse after periods of inactivity. Which of the following signs is the most likely to be present?

A. Exaggerated lumbar lordosis
 B. Positive femoral stretch test
 C. Positive Trendelenburg test
 D. Restricted straight leg raising
 E. Sacroiliac joint tenderness

The correct answer is E. Common presentation of ankylosing spondylitis. Stiffness first thing in the morning and after inactivity, lower back pain radiating into the buttocks

49. A 56-year-old female presented with pain in the left side of her neck radiating down the lateral aspect of her arm and forearm. She had also noticed some weakness of her left shoulder and struggled to elevate her arm. She had a longstanding history of rheumatoid arthritis, treated with steroids and Penicillamine. On examination there was some wasting over the left deltoid and evidence of fasciculations. Neck movements appeared full except that lateral movement exacerbated the left arm pain. On examination of the upper limb, tone appeared reduced at the elbow and wrist and the biceps jerk was only present on re-enforcement. The left Supinator jerk was inverted and the triceps jerk appeared brisk. There was some weakness of left shoulder abduction, elbow flexion and supination, but finger movements and elbow extension were intact. There was a sensory deficit over the lateral aspect of the left upper arm and forearm. The right arm appeared normal. On examination of the lower limb, tone was increased, but power appeared normal. All reflexes were brisk and both plantar responses were extensor. What is the most likely diagnosis?

A. Cervical myelopathy
 B. Circumflex neuropathy
 C. Inclusion body myositis
 D. Motor neurone disease
 E. Steroid-induced myopathy

The correct answer is A. This patient has a cervical myelopathy, most likely as a result of her rheumatoid arthritis. The likely level is C5/C6 given that there is weakness of the deltoid, biceps and Supinator and the Supinator jerk is inverted. She also has long tract signs in her legs with hypertonia and hyper-reflexia. A circumflex neuropathy would account for the weakness and fasciculations of the deltoid, but would not explain the upper motor neurone signs in the legs, or weakness of the biceps and Supinator.

Inclusion body myositis, an inflammatory myopathy, would present with bilateral often-asymmetrical weakness, which has a tendency to affect distal musculature. The tendon reflexes would be normal and the creatine kinase would be normal or mildly elevated. Motor neurone disease presents with upper and lower motor signs in absence of sensory disturbance. A steroid induced myopathy would cause proximal weakness and wasting with normal reflexes and sensation.

50. A 36 year-old man has a 3 month history of pain in his feet and lower legs. He was diagnosed as having diabetes at age 14 and treated with insulin. He is a cannabis smoker and drinks 30 units of alcohol per week. On examination he has impaired pain and temperature sensation in feet and lower legs, normal joint position and vibration sense. His reflexes are normal. What is your diagnosis?

A. Alcoholic polyneuropathy.
 B. Chronic inflammatory demyelinating polyneuropathy (CIDP).
 C. Diabetic polyneuropathy.
 D. Syringomyelia.
 E. Vitamin B 12 deficiency.

The correct answer is C. The history suggests small fiber painful peripheral sensory neuropathy. The commonest cause is diabetes. Vitamin B12 deficiency causes impairment of joint position and vibration. Chronic inflammatory demyelinating polyneuropathy (CIDP) causes a large fiber peripheral neuropathy with areflexia. In syringomyelia you have impaired pain and temperature only in the upper limbs. Typically with alcoholic polyneuropathy all fiber types are affected and it is seen with higher alcohol consumption than 30 units

51. A 70 year-old man is admitted with an acute stroke. Examination revealed a left Horner's syndrome, loss of corneal reflex on the left together with loss of pinprick sensation on the left face. His left gag reflex was also decreased. He had left limb ataxia with right hemi- sensory loss of pain and temperature sensation. Which one of the following arterial territories has been affected?

A. Basilar
 B. Left posterior communicating
 C. Left posterior inferior cerebellar
 D. Right posterior inferior cerebellar
 E. Right superior cerebellar

The correct answer is C. The clinical features are typical of lateral medullary syndrome. They consist of ipsilateral signs of Horner's syndrome, facial loss,

pharyngeal weakness and ataxia and contralateral signs of spinothalamic sensory loss of the limbs. The posterior inferior cerebellar artery is affected.

52. A 50-year-old woman is referred with a two-week history of walking difficulty and weakness in her arms. On examination, there was proximal and distal limb weakness which is more marked, in the legs than the arms. All tendon reflexes were absent and the plantar responses were flexor. There was no sensory loss. Blood pressure in the supine position was 140/75 mmHg (lying) and was 110/70 mmHg on standing. What is the most likely diagnosis?

A. Cervical cord compression
B. Guillain-Barre syndrome
C. Myasthenia gravis
D. Poliomyelitis
E. Polymyositis

The correct answer is B. This is a classical presentation of Guillain-Barre with the gradual development of ascending weakness with autonomic involvement

53. A 19-year-old female presents with a 3 days history of progressive weakness and numbness of her legs, urinary retention and back pain 2 weeks following an upper respiratory infection. On examination there is spastic paraparesis, sensory level up to T5, extensor planters. Examination of cranial nerves and upper limbs is normal. MRI of the spine is normal. What is the most likely diagnosis?

A. Anterior spinal artery occlusion
B. Guillain Barre syndrome
C. Multiple sclerosis
D. Post-infectious transverse myelitis
E. Thoracic disc prolapse

The correct answer is D. Transverse myelitis usually follows an upper respiratory tract infection. It causes a complete spinal cord syndrome. MRI spine may show an intrinsic inflammatory lesion or be normal. Multiple sclerosis usually causes a partial spinal cord syndrome (asymmetrical paraparesis). Anterior spinal artery occlusion causes an acute onset of spinal cord syndrome with spinal shock (flaccid paraplegia). Guillain Barre Syndrome causes lower motor neuron signs.

54. A 70 year-old woman presents with acute back pain followed by weakness of dorsiflexion of her left foot. Where would you expect the associated sensory loss?

A. Anterior thigh
B. Dorsum of foot
C. Perineum
D. Posterior calf
E. Sole of foot

The correct answer is B. The features suggest an L5 radiculopathy which would be associated with a loss of sensation in the dorsum of the foot and big toe.

55. A 20-year-old female presents with seizures. She is fit and healthy but had been unwell for 3 days prior to admission with flu-like symptoms. The patient's friends tell you that prior to the seizure she had become confused and her behavior had been out of character. On examination the patient is post-ictal, with a fever of 39.1°C. She has a pulse of 100 bpm and a blood pressure of 130/70 mmHg. A CT head shows no abnormalities. CSF examination shows no organisms, with a white cell count of 353/mm³ (<5) mostly lymphocytes with a protein concentration of 2.3 g/l (0.29-1.98). What is the likely diagnosis?

A. Epilepsy
B. Herpes simplex encephalitis
C. Meningococcal meningitis
D. Pneumococcal meningitis
E. Viral meningitis

The correct answer is B. Herpes simplex encephalitis presents with behavioral changes or psychiatric disturbance, focal seizures, fever and alteration in consciousness. It has peaks of presentation in the young and old. A CT of the brain may be normal, but an MRI may reveal the diagnosis. CSF shows a pleomorphic monocyctosis with raised protein sometimes elevated red cells and a normal or low glucose. A high index of suspicion should give you the diagnosis, and if in doubt, intravenous acyclovir will protect the patient whilst other avenues are being explored.

56. A 17-year-old female presents with three attacks of headache over a six month period. She describes the headaches as severe, right-sided and lasting for twelve hours and associated with nausea and photophobia. Each is preceded by spots before her eyes. What is the most appropriate initial treatment for this patient?

A. Diclofenac at the onset of the next attack
B. Ergotamine: suppository at the onset of the next attack
C. Paracetamol plus metoclopramide at the onset of the next attack
D. Prophylaxis with propranolol
E. Sumatriptan at the onset of the next attack

The correct answer is C. First line treatment of acute migraine consists of simple analgesic (either soluble paracetamol or aspirin) and an antiemetic (usually domperidone or metoclopramide). Second line treatment includes the use of non-steroidal-antiinflammatory drugs such as diclofenac. If the above measurements fail to alleviate the attacks, then triptans therapy (e.g. sumatriptan) is indicated. It is important for patients to take the treatment as early as possible. Long-term prophylaxis with drugs (e.g. propranolol) is only indicated if the attacks are frequent (>2/month).

57. A 29-year-old female presents with drooping of the left side of her face and an inability to close her left eye. She had a viral illness in the preceding week. There is no past medical history. On examination, there is a left facial nerve palsy. The remaining cranial nerves are normal. Power, tone and reflexes are normal in the limbs. **What is the best course of treatment?**

- A. Intravenous immunoglobulin
- B. Oral Augmentin
- C. Oral steroids and oral acyclovir
- D. Oral valacyclovir
- E. Plasmapheresis

The correct answer is C. This is the classical history of a post-viral Bells palsy. There is some evidence to support a short course of steroids and acyclovir. The studies suggest reduced loss of function and increased recovery from facial nerve palsy with early treatment. You need to be confident that there are no features of Guillain-Barre (test reflexes), or brainstem vascular disease or space occupying lesion. The neurological examination of the cranial nerves thus needs to be completed with care.

58. A 66 year-old male presents with a sudden onset of ataxia, vomiting and headache, followed by increasing drowsiness. What is the most likely diagnosis?

- A. Acute cerebellar hemorrhage
- B. Acute subdural hemorrhage
- C. Frontal subdural empyema
- D. Herpes simplex encephalitis
- E. Pituitary apoplexy

The correct answer is A. Acute cerebellar infarct or hemorrhage is associated with acute onset of ataxia, headache and vomiting and eventually drowsiness and coma due to the development of obstructing hydrocephalus. Early CT brain and close observation is essential in the management of acute cerebellar hemorrhage.

59. A 69-year-old male presents with sudden onset weakness of his legs associated with urinary retention. Examination revealed a flaccid paraparesis of the legs with absent tendon reflexes and plantar responses. Pinprick and temperature sensations were absent to T12 level but there was a relative sparing of light touch and joint position sensation. What is the most likely diagnosis?

- A. Anterior spinal artery occlusion
- B. Intramedullary spinal cord metastasis
- C. Spinal cord compression due to vertebral metastasis
- D. T11/12 central disc prolapse
- E. Transverse myelitis

The correct answer is A. The lesion is involving the anterior 2/3 of the spinal cord which spares light touch, vibration and position sense but causes loss of pain and temperature sensation distally. The diagnostic possibilities therefore include anterior spinal artery occlusion, which is rare and intramedullary spinal cord metastasis. The condition has developed quite suddenly which is the key and supports a vascular event. Intramedullary spinal cord lesions are also rare and vertebral metastasis causing cord compression" occur more commonly, however the clinical signs suggest sparing of the dorsal column.

60. 36-year-old lady presents with a 3 day history of slurred speech. She also complains of double vision and a sensation of breathlessness. The Oxygen saturations are 99% on air. Neurological examination reveals normal power, reflexes and plantar responses. **Which of the following would improve symptoms in this presentation?**

- A. Edrophonium
- B. Immunoglobulin
- C. Non-steroidal anti-inflammatory drugs
- D. Physiotherapy
- E. Plasmapheresis

The correct answer is A. This lady has symptoms suggesting Myasthenia Gravis. Her breathlessness is probably secondary to anxiety about the symptoms and associated hyperventilation. Edrophonium (Tensilon) is sometimes used in the diagnosis of Myasthenia Gravis and would be expected to temporarily improve symptoms.

61. A 45-year-old man has a history of progressive weakness for 5 weeks. He had particular difficulty getting out of the bath. On examination there was severe truncal and proximal limb weakness, without wasting or fasciculation. Tendon reflexes, plantar responses and sensation were all normal. The vital capacity was 1.8L. **What is the most likely diagnosis?**

- A. cervical myelitis
- B. Guillain-Barre syndrome
- C. Polio
- D. Polymyositis
- E. Syringobulbia

The correct answer is D. The presentation of myopathy is characterized by proximal weakness with normal reflexes and sensation and the absence of fasciculation. Polymyositis is the commonest cause of inflammatory muscle disease in < 50 years old (inclusion body myositis is the commonest in >50 years old).

62. A 54-year-old female is admitted with progressive weakness following a trivial flu-like illness. Which of the following would **EXCLUDE** Guillain-Barre Syndrome as the diagnosis?

- A. Autonomic dysfunction
- B. Elevated protein on CSF examination
- C. Evidence of muscle wasting
- D. Ophthalmoplegia
- E. Sensory level below T1

The correct answer is E. GBS is a post-infectious acute polyneuritis characterized by elevated CSF protein with few cells and often normal glucose. There is a profound weakness associated with areflexia and peripheral sensory neuropathy. Ophthalmoplegia is associated in particular with the Miller-Fisher variant. However, a sensory level is NOT a feature and would suggest cervical myelopathy. Muscle wasting is typical with prolonged illness. Autonomic disease may also feature.

63. A 68-year-old man presents with progressive visual impairment. On examination there is an incongruous homonymous hemianopia. What is the most likely anatomical site of the neurological lesion?

- A. chiasma
- B. occipital lobe
- C. optic nerve
- D. optic radiation
- E. optic tract

The correct answer is E. Optic neuropathy causes a central scotoma, an optic tract lesion an incongruous homonymous hemianopia, a chiasmal lesion a bitemporal hemianopia, an optic radiation and occipital lobe lesion a congruous homonymous hemianopia.

64. A 38-year-old man comes to the physician because of slowly progressive visual problems that make him "bump into objects" on both sides. Ocular examination shows bitemporal field loss with preserved visual acuity. Which of the following is the most likely diagnosis?

- A. Occipital lobe meningioma.
- B. Optic glioma.
- C. Optic nerve atrophy.
- D. Optic neuritis.
- E. Pituitary adenoma.

The correct answer is E. The visual deficit present in this patient is described as bilateral temporal hemi-anopia and is due to chiasmatic lesions that compromise the crossing fibers originating from the temporal retina. A large pituitary adenoma (macroadenoma) that extends beyond the sella turcica into the suprasellar region is the most common cause of temporal hemianopia. Craniopharyngioma and meningioma are other causes.

Extended Matched Questions (EMQ)

1. Headache

- | | |
|-------------------------|----------------------------|
| A. Amaurosis fugax | H. Meningitis |
| B. Analgesic headache | I. Migraine |
| C. Cluster headache | J. Sinusitis |
| D. Encephalitis | K. Subarachnoid hemorrhage |
| E. Epilepsy | L. Subdural hematoma |
| F. Episcleritis | M. Tension headache |
| G. Giant cell arteritis | |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 40-year-old man complains of severe headache of sudden onset 4 h ago, likened to being kicked in the back of the head. He has vomited twice and is now feeling stiff in his neck. ☐
2. A 30-year-old man complains of rapid-onset pain around his left eye every night for the last 2 weeks, associated with lid swelling, watery eye and flushing. He suffers from these bouts every 3 months. ☐
3. A 55-year-old woman presents with a headache that has lasted a few weeks. She gets pain in her jaw during meals and her scalp is tender on palpation. ☐
4. A 40-year-old woman complains of a headache that feels like a tight band around her head. ☐
5. A 24-year-old woman complains of a unilateral throbbing headache lasting 6 hours associated with vomiting and photophobia. She has had several episodes in the past. ☐

Answers: K C G M I

1. A 40-year-old man complains of severe headache of sudden onset 4 h ago, likened to being kicked in the back of the head. He has vomited twice and is now feeling stiff in his neck.

Answer is K: Subarachnoid hemorrhage is usually caused by rupture of berry aneurysms found on the circle of Willis. Disease states associated with high blood pressure, e.g. coarctation of aorta, polycystic disease or defective collagen synthesis, e.g. Ehlers-Danlos syndrome, predispose to berry aneurysm formation. Typical symptoms are of a severe occipital headache that is sometimes likened to being 'kicked in the back of the head'. Initial investigation of choice is a CT brain scan. However, findings can be negative in 10-15 per cent of subarachnoid hemorrhage. In patients in whom clinical suspicion is high and CT scan is negative, lumbar puncture (LP) should be performed. Subarachnoid hemorrhage is confirmed by presence of xanthochromia resulting from denatured red blood cells within the cerebrospinal fluid (CSF). This can take up to 12 h to form and, therefore, LP should be delayed for at least 12 h after onset of headache. Discoloration of the CSF should be uniform, unlike a bloody tap where more red blood cells are present in the initial sample. Some patients may present with a small sentinel bleed with minimal symptoms. It is important to make this diagnosis because timely intervention may prevent a more catastrophic later event.

2. A 40-year-old woman complains of a headache that feels like a tight band around her head.

Answer is C: Tension headaches are common and the 'band-like' headache is a classic description. Diagnosis requires the absence of symptoms and signs of other types of headache. Treatment is rarely effective and avoidance of the precipitants, e.g. stress, is the best remedy. Chronic use of analgesics can lead to 'rebound headache' on withdrawal. Antidepressants are sometimes prescribed, although benefit is uncertain.

3. A 55-year-old woman presents with a headache that has lasted a few weeks. She gets pain in her jaw during meals and her scalp is tender on palpation.

Answer is G: Giant cell arteritis is a medium-sized vessel vasculitis. Classically it affects the temporal vessels giving symptoms of headache, scalp tenderness and jaw claudication. There is a risk of blindness if the disease is left untreated and treatment should be commenced empirically with oral corticosteroids. Diagnosis can be confirmed with a temporal artery biopsy and the condition is usually associated with a high erythrocyte sedimentation rate (ESR)/C-reactive protein (CRP). CRP is always elevated, although ESR is very occasionally normal. As disease may not affect the part of the artery that has been biopsied, treatment should be continued even though the biopsy is negative if the clinical suspicion is high. Giant cell arteritis is recognized to overlap with polymyalgia rheumatica.

4. A 30-year-old man complains of rapid-onset pain around his left eye every night for the last 2 weeks, associated with lid swelling, watery eye and flushing. He suffers from these bouts every 3 months.

Answer is M: Cluster headache typically presents with recurrent brief attacks of headache around the eye. The hallmark of cluster headache is the association with autonomic symptoms and signs, e.g. nasal stuffiness, conjunctival hyperemia, Horner's syndrome. The clusters usually last between a few weeks and a few months.

5. A 24-year-old woman complains of a unilateral throbbing headache lasting 6 hours associated with vomiting and photophobia. She has had several episodes in the past.

Answer is I: The classic description of migraine includes a preceding aura before the onset of the headache, but this feature does not occur in most patients.

2. Headache

- | | |
|-------------------------------------|----------------------------|
| A. Acute glaucoma | H. Scleritis |
| B. Benign intracranial hypertension | I. Space-occupying lesion |
| C. Cluster headache | J. Subarachnoid hemorrhage |
| D. Febrile convulsion | K. Subdural hematoma |
| E. Meningitis | L. Trigeminal neuralgia |
| F. Migraine | M. Uveitis |
| G. Migrainous neuralgia | |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

- A 56-year-old woman complains of unilateral stabbing pain on the surface of her scalp and around her eye. The pain is precipitated by washing or touching the specific area. ☐
- A 28-year-old woman complains of headache and double vision which is worse when lying down. Examination reveals papilledema but no focal signs. There are no abnormal findings on CT. ☐
- A 30-year-old man complains of a dull headache that is worse when lying down or when coughing. He has recently suffered a seizure. ☐
- A 65-year-old woman complains of a constant aching pain around the right eye radiating to the forehead. There is reduced vision in the eye, which is red and congested with a dilated pupil. ☐
- A 70-year-old woman complains of headache, drowsiness and unsteadiness over the last couple of days. On examination she is found to have papilledema. She remembers falling over 3 weeks ago. ☐

Answers: L B I A K

1. A 56-year-old woman complains of unilateral stabbing pain on the surface of her scalp and around her eye. The pain is precipitated by washing or touching the specific area.

Answer is L: This woman gives a classic history of trigeminal neuralgia affecting the ophthalmic division of the trigeminal nerve. This condition more commonly presents in the mandibular and maxillary branches. It is principally a complaint in older patients.

2. A 28-year-old woman complains of headache and double vision which is worse when lying down. Examination reveals papilledema but no focal signs. There are no abnormal findings on CT.

Answer is B: Benign intracranial hypertension is a condition of unknown aetiology which usually affects obese women. Steroids and tetracyclines are recognized precipitants.

Diagnosis of raised CSF pressure is made by LP. Symptoms often resolve after LP. Chronic treatment includes the use of repeated LPs and diuretics.

3. A 30-year-old man complains of a dull headache that is worse when lying down or when coughing. He has recently suffered a seizure.

Answer is I: A description of early morning headache that is exacerbated by lying down, coughing, and sneezing is a classic description of raised intracranial pressure. The development of seizures is a sinister finding and urgent imaging is warranted.

4. A 65-year-old woman complains of a constant aching pain around the right eye radiating to the forehead. There is reduced vision in the eye, which is red and congested with a dilated pupil.

Answer is A: Acute closed angle glaucoma mostly affects the long-sighted elderly population. It is caused by blockage of drainage of aqueous humor from the anterior chamber via the canal of Schlemm. Stimuli that cause pupillary dilatation (e.g. sitting in the dark) increase the tightness of contact between the iris and the lens and can precipitate an attack.

5. A 70-year-old woman complains of headache, drowsiness and unsteadiness over the last couple of days. On examination she is found to have papilledema. She remembers falling over 3 weeks ago.

Answer is K: There is not always a prior history of head injury. Alcohol abuse is a risk factor for chronic subdural hemorrhage. Neurosurgical opinion should be sought early, although many subdural hemorrhages can be handled conservatively because the bleeds clot spontaneously. The presence of papilledema indicates that the subdural bleed is increasing the intracranial pressure. Initially the intracranial compliance is high and so the increase in volume caused by the developing bleed causes only small increases in intracranial pressure. However, this compliance decreases (compensatory mechanisms to cope with increases in pressure are limiting) and small increases in volume are associated with large increases in intracranial pressure. This is clinically important because patients may deteriorate very quickly and should therefore be regularly monitored.

3. Weakness in the legs

- | | |
|--------------------------------|---------------------------|
| A. alcohol-induced neuropathy | G. myasthenia gravis |
| B. bilateral stroke | H. neurofibromatosis |
| C. Charcot-Marie-Tooth disease | I. Parkinson's disease |
| D. Guillain Barré syndrome | J. polymyalgia rheumatica |
| E. Motor neuron disease | K. polymyositis |
| F. multiple sclerosis | L. Syringomyelia |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 60-year-old woman complains of bilateral proximal muscle weakness in the legs and dysphagia. On examination she has a purple rash on her cheeks. ☐

2. A 40-year-old man presents with a recent history of progressive weakness in the arms and legs after an episode of diarrhoea. Examination revealed flaccid weakness of limbs with no reflexes. ☐

3. A 55-year-old man presents with bilateral progressive worsening muscle weakness. There is marked wasting of lower limb muscles and very brisk lower limb reflexes. Sensation is normal. ☐

4. A 13-year-old boy presents with bilateral pes cavus with clawing of the toes. There is atrophy of peroneal muscles and reduced reflexes and sensation distally. ☐

5. A 30-year-old secretary presents with bilateral leg weakness and blurred vision. Fundoscopy reveals pale optic discs bilaterally. ☐

Answers: K D E C F

1. A 60-year-old woman complains of bilateral proximal muscle weakness in the legs and dysphagia. On examination she has a purple rash on her cheeks.

Answer is K: There are many non-neurological causes of weakness in the legs. Polymyositis is an autoimmune disease characterized by non-suppurative inflammation of skeletal muscle. In severe disease there can be respiratory muscle weakness and also cardiac involvement. Creatine kinase (CK) is usually markedly elevated. Electromyography (EMG) characteristically shows fibrillation potentials.

2. A 40-year-old man presents with a recent history of progressive weakness in the arms and legs after an episode of diarrhoea. Examination revealed flaccid weakness of limbs with no reflexes.

Answer is D: Guillain-Barré syndrome describes a presentation of an ascending polyneuropathy of unknown aetiology, which may be associated with a preceding infection. The weakness is symmetrical and may affect proximal muscles sooner than distal ones. Cranial nerves and the autonomic nervous system may also be involved. Involvement of respiratory muscles can be fatal and regular monitoring of vital capacity is important. In these cases it is often safer to initiate ventilation sooner rather than later. Sensory symptoms are usually mild with complaints of numbness and tingling in the limbs. Intravenous immunoglobulin is often used to shorten the duration of the disease. Prognosis is good with over 85 per cent patients making a complete or near complete recovery.

3. A 55-year-old man presents with bilateral progressive worsening muscle weakness. There is marked wasting of lower limb muscles and very brisk lower limb reflexes. Sensation is normal.

Answer is E: Motor neuron disease (MND) is a progressive degenerative disease that affects the upper and lower motor neurons (LMNs). There is characteristically NO sensory involvement. It is useful to be familiar with the following three common patterns of involvement:

- (i) Progressive muscular atrophy: anterior horn wasting lesion with wasting often beginning in the distal muscles of the hand and then spreading. Fasciculation is a common finding.
- (ii) Amyotrophic lateral sclerosis: involvement of the lateral corticospinal tract gives a progressive spastic quadriplegia/paraparesis. The presence of LMN signs, e.g. wasting, fasciculation differentiates this diagnosis from other causes of spastic weakness.
- (iii) Progressive bulbar palsy: the lower cranial nerve nuclei and their connections are primarily affected. Dysarthria and dysphagia are common symptoms. This pattern of disease is more common in women than in men.

4. A 13-year-old boy presents with bilateral pes cavus with clawing of the toes. There is atrophy of peroneal muscles and reduced reflexes and sensation distally.

Answer is C: Charcot-Marie-Tooth disease is progressive peroneal muscle atrophy. There are both autosomal dominant and recessive inheritances observed in different families. Charcot-Marie-Tooth disease is now described as a hereditary sensorimotor neuropathy (HSMN) because several clinical variants have been identified associated with different gene defects.

HSMN types I and II are the most common types.

HSMN type I is a demyelinating neuropathy of insidious onset presenting typically in the first decade of life with foot deformities (e.g. pes cavus), muscle weakness (distal weakness that affects legs earlier and more severely than arms) and loss of balance. The presence of foot drop results in frequent trips and falls.

HSMN type II usually presents later in the second decade of life. The weakness in distal lower limb muscles is often accompanied by distal sensory loss. Foot deformities are less marked than in type I disease and patients may even be completely asymptomatic.

5. A 30-year-old secretary presents with bilateral leg weakness and blurred vision.

Fundoscopy reveals pale optic discs bilaterally.

Answer is F: In this case the pale bilateral optic discs indicate previous subclinical episodes of optic neuritis. Multiple sclerosis (MS) is an inflammatory demyelinating disease of the central nervous system (CNS) that has a progressive course. There is an increased prevalence further away from the equator but the aetiology is still unknown. More women are affected (1.5–2:1). Diagnosis is made clinically but magnetic resonance imaging (MRI) is the imaging of choice to detect demyelinating plaques. CSF examination usually shows oligoclonal bands of IgG on electrophoresis.

Electrophysiological tests reveal delays in the propagation of potentials (e.g. visual, somatosensory, auditory evoked potentials). Intravenous methylprednisolone can reduce the severity of relapses but does not improve long-term prognosis. Interferon has been shown to reduce the relapse rate in patients suffering from the relapsing remitting form of the illness but its use is limited because of its high cost.

4. Nerve lesions

- | | |
|---------------------------|-----------------|
| A. C8, T1 | H. Radial nerve |
| B. Common peroneal nerve | I. S1 |
| C. L1 | J. S2 |
| D. L2 | K. T10 |
| E. Long thoracic nerve | L. T12 |
| F. Median nerve | M. Ulnar nerve |
| G. Posterior tibial nerve | |

For each clinical scenario below, give the most likely cause for the clinical findings. Each option may be used only once.

1. Inability to dorsiflex foot after blow to the side of knee.

2. Sensory loss over medial one and a half fingers.

3. A 25-year-old man presents with a winged scapula and the inability to raise his arm above the horizontal.

4. Sensory loss bilaterally below the level of the umbilicus.

5. Right-sided ptosis, miosis and wasting of small muscles of the right hand.

Answers: B M E K A

1. Inability to dorsiflex foot after blow to the side of knee.

Answer is B: The blow to the leg compresses the common peroneal nerve against the head of the fibula. There is a weakness in eversion and the presence of foot drop. There may be some numbness on the anterolateral aspect of the shin.

2. Sensory loss over medial one and a half fingers.

Answer is M: The median nerve supplies sensation to the palmar surface of the first three and a half fingers. In ulnar nerve palsy there may be features of a 'claw hand', i.e. hyperextension at the metacarpophalangeal joints and flexion at the interphalangeal joints of the fourth and fifth fingers.

3. A 25-year-old man presents with a winged scapula and the inability to raise his arm above the horizontal.

Answer is E: The long thoracic nerve supplies serratus anterior which allows the lateral and forward movement of the scapula.

4. Sensory loss bilaterally below the level of the umbilicus.

Answer is K: T10 is the level of the umbilicus

5. Right-sided ptosis, miosis and wasting of small muscles of the right hand.

Answer is A: This is often called a Klumpke's paralysis (C8-T1 lesion) with paralysis of the small muscles of the hand, arm held in adduction and lack of sensation over the ulnar side of the arm. The presence of a Horner's syndrome results from an avulsion of T1 (the preganglionic sympathetic fibres leave the spinal nerve soon after it emerges from the intervertebral foramen).

5. Cranial nerve lesions

- | | |
|----------------------|----------------------------|
| A. IV lesion | G. Right XI lesion |
| B. IV, V, VII lesion | H. Right XII lesion |
| C. IX lesion | I. V lesion |
| D. IX, X lesion | J. V, VII, VIII lesion |
| E. Left XI lesion | K. V, VII, VIII, IX lesion |
| F. Left XII lesion | L. VI lesion |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 55-year-old man presents with unilateral weakness, wasting and fasciculation of the tongue. On examination the tongue deviates to the left on protrusion. ☐
2. A 44-year-old man presents with progressive perceptive deafness, vertigo, unilateral facial weakness and loss of sensation on that side of the face. Imaging reveals the presence of a cerebellopontine tumour. ☐
3. A patient complains of a hoarse voice, difficulty in swallowing and choking when drinking fluids. Examination reveals visible weakness of elevation of the palate, depression of palatal sensation and loss of the gag reflex. ☐
4. A 28-year-old man presents after surgery with an inability to rotate the head to the right and to shrug the left shoulder. ☐
5. A 35-year-old woman with multiple sclerosis complains of diplopia. Examination reveals inability to abduct pupil on one side. ☐

Answers: F J D E L

1. A 55-year-old man presents with unilateral weakness, wasting and fasciculation of the tongue. On examination the tongue deviates to the left on protrusion.
Answer is F: Tongue deviates to the side of the lesion.

2. A 44-year-old man presents with progressive perceptive deafness, vertigo, unilateral facial weakness and loss of sensation on that side of the face. Imaging reveals the presence of a cerebellopontine tumour.

Answer is J: Cerebellopontine tumors often present clinically as a result of impingement on cranial nerves in the cerebellopontine angle.

3. A patient complains of a hoarse voice, difficulty in swallowing and choking when drinking fluids. Examination reveals visible weakness of elevation of the palate, depression of palatal sensation and loss of the gag reflex.

Answer is D: Cranial nerve IX and X lesions rarely occur in isolation and can also accompany nerve XI and XII lesions after infarction in the brain stem or as a result of pathology around the jugular foramen.

4. A 28-year-old man presents after surgery with an inability to rotate the head to the right and to shrug the left shoulder.

Answer is E: Accessory nerve is the motor supply to trapezius and sternocleidomastoid. The latter muscle allows rotation of the head to the opposite side.

5. A 35-year-old woman with multiple sclerosis complains of diplopia. Examination reveals inability to abduct pupil on one side.

Answer is L: Diplopia in multiple sclerosis can result from demyelination of cranial nerves associated with eye movements, i.e. III, IV and VI.

6. Abnormal movements

- | | |
|------------------|------------------------|
| A. akathisia | G. pill-rolling tremor |
| B. asterixis | H. senile dystonia |
| C. chorea | I. tardive dyskinesia |
| D. dysmetria | J. tics |
| E. hemiballismus | K. torticollis |
| F. myoclonus | L. Tourette's syndrome |

For each clinical scenario below, give the most likely cause for the clinical findings. Each option may be used only once.

1. A jerky tremor of outstretched hands in an alcoholic with decompensated liver disease. ☐
2. Non-rhythmic jerky purposeless movements in the hands of a 55-year-old man. ☐
3. A 75-year-old man with poorly controlled diabetes is distressed by wild flinging of his right arm and right leg. ☐
4. Grimacing and involuntary chewing in a 75-year-old woman on long-term treatment with neuroleptics. ☐
5. Past-pointing in a 60-year-old woman being investigated for unsteady gait. ☐

Answers: B C E I D

1. A jerky tremor of outstretched hands in an alcoholic with decompensated liver disease.
Answer is B: This is elicited by asking the patient to 'stretch out your arms and cock your wrists back'.

2. Non-rhythmic jerky purposeless movements in the hands of a 55-year-old man.
Answer is C: Huntington's disease is an autosomal dominant condition resulting from a trinucleotide repeat mutation on the short arm of chromosome 4. There is marked loss of neurons in the caudate nucleus and putamen. The patient usually presents in middle age with development of chorea. The condition is progressive and dementia may occur in the latter stages. Tetrabenazine is often used to control the choreiform movements. Sydenham's chorea is a rare complication of rheumatic fever that involves onset of choreiform movements later in life.

3. A 75-year-old man with poorly controlled diabetes is distressed by wild flinging of his right arm and right leg.

Answer is E: Usually the underlying pathology is infarction/hemorrhage in the contralateral subthalamic nucleus.

4. Grimacing and involuntary chewing in a 75-year-old woman on long-term treatment with neuroleptics.

Answer is I: Tardive dyskinesia is a movement disorder that usually appears only after long-term treatment with typical antipsychotic medications and other drugs with dopamine antagonist activity, e.g. metoclopramide. Withdrawal of the responsible drug can lead to improvement but the condition is irreversible in some patients. Atypical antipsychotic medications such as clozapine and risperidone are less likely to cause extrapyramidal side effects and tardive dyskinesia.

5. Past-pointing in a 60-year-old woman being investigated for unsteady gait.
Answer is D: Dysidiadochokinesis (incoordination of rapidly alternating movement), nystagmus and intention tremor are signs of cerebellar disease that can be easily elicited/observed at the bedside.

7. Neurological problems

- A. Bell's palsy
- B. cervical spondylosis
- C. chronic fatigue syndrome
- D. melanoma
- E. muscular dystrophy
- F. myasthenia gravis

- G. neurofibromatosis
- H. pseudobulbar palsy
- I. Shy-Drager syndrome
- J. Sturge-Weber syndrome
- K. syringomyelia

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 45-year-old woman complains of a pain behind the right ear and that her mouth is sagging on the right-hand side. ☐
2. A 62-year-old woman presents with a stiff spastic tongue and 'Donald Duck'-like speech. On examination she had a brisk jaw jerk and was prone to laughing inappropriately. ☐
3. A 27-year-old woman presents with wasting and weakness of the small muscles of the hand. Examination reveals loss of pain and temperature sensation over the trunk and arms with intact vibration sense. ☐
4. A 34-year-old woman complains of generalized weakness in her muscles, diplopia and weakening of her voice if talking for longer than 30 s. Examination reveals bilateral ptosis. ☐
5. A 15-year-old boy is found to have several coffee-colored patches on his body. Slit-lamp examination reveals the presence of Lisch nodules. ☐

Answers: A H K F G

1. A 45-year-old woman complains of a pain behind the right ear and that her mouth is sagging on the right-hand side.
Answer is A: In a Bell's palsy (lower motor neuron lesion affecting cranial nerve VII) all the muscles on one half of the face are affected. There may also be loss of taste sensation on the anterior two-thirds of the tongue because the facial nerve supplies sensory innervation to that area via the chorda tympani. Improvement and complete recovery are common. EMG can often be a good predictor of outcome. In an upper motor neuron lesion (caused by a cerebrovascular accident or CVA, for example) there is sparing of the forehead as a result of bilateral innervation. The patient will be able to raise both eyebrows.
2. A 62-year-old woman presents with a stiff spastic tongue and 'Donald Duck'-like speech. On examination she had a brisk jaw jerk and was prone to laughing inappropriately.

Answer is H: Pseudobulbar palsy is an upper motor neuron lesion caused by bilateral lesions of the lower cranial nuclei and can be associated with emotional lability. It is known to occur in multiple sclerosis, motor neuron disease and after bilateral strokes affecting the corticobulbar pathways.

3. A 27-year-old woman presents with wasting and weakness of the small muscles of the hand. Examination reveals loss of pain and temperature sensation over the trunk and arms with intact vibration sense.

Answer is K: Syringomyelia is the term used to describe the development of a fluid filled cavity (syrinx) within the spinal cord. The condition may be associated with an Arnold-Chiari malformation. The expansion of the syrinx compresses surrounding tracts, giving rise to a particular pattern of symptoms/signs that relates to the position of the tracts within the spinal cord. The pain and temperature modalities are characteristically affected first as a result of compression of decussating spinothalamic fibres anteriorly in the ventral horns. This loss of pain and temperature sensation is often described as occurring in a 'cape' distribution (over trunk and arms). Wasting and weakness of hands and arms reflects involvement of cervical anterior horn cells. Sensory loss can result in Charcot's joints (neuropathic joints damaged through loss of sensation). Involvement of the sympathetic trunk can give rise to Horner's syndrome. The condition is gradually progressive and there is no known curative treatment. Patients with an Arnold-Chiari malformation may be treated with decompression at the foramen magnum to slow progression.

4. A 34-year-old woman complains of generalized weakness in her muscles, diplopia and weakening of her voice if talking for longer than half a minute. Examination reveals bilateral ptosis.

Answer is F: Myasthenia gravis (MG) is an acquired autoimmune disease characterized by muscle weakness and fatigability resulting from the presence of anti-acetylcholine receptor antibodies. MG is associated with other autoimmune disease, e.g. thyroid disease. The patient usually presents as a young adult with extraocular and bulbar muscle weakness. Weakness of the facial muscles is very common. Indeed bilateral facial weakness gives rise to the classic horizontal smile called a 'myasthenic snarl'. Neck weakness leads to the head drooping. Limb weakness is usually much more pronounced proximally.

Detection of anti-acetylcholine receptor antibodies is a reliable test for diagnosis of MG.

A test dose of an anticholinesterase, e.g. edrophonium, improves muscle power and can also be used to aid diagnosis. Myasthenia gravis can be treated with the use of anti cholinesterases (oral pyridostigmine is a popular drug) and oral corticosteroids (for immunosuppression). Be aware of Eaton-Lambert syndrome (a manifestation of bronchial small cell carcinoma) where there is defective release of acetylcholine at neuromuscular junctions giving rise to a myasthenic syndrome. In myasthenic syndrome the muscle strength increases and reflexes return with repeated contraction, unlike MG where repeated contraction gives rise to more weakness and a reduction of reflexes.

5. A 15-year-old boy is found to have several coffee-colored patches on his body.

Slit-lamp examination reveals the presence of Lisch nodules.

Answer is G: This is a presentation of type I neurofibromatosis (also known as von Recklinghausen's disease). It is an autosomal dominant condition characterized by decreased production of neurofibromin. Diagnosis requires two of seven diagnostic criteria.

- i. Six or more cafe-au-lait spots ≥ 5 mm (in children ≥ 10) or ≥ 15 mm in adults
- ii. axillary/inguinal freckling
- iii. Two or more neurofibroma or even one plexiform neurofibroma
- iv. Optic glioma
- v. Two or more Lisch nodules (iris hamartoma detected with slit-lamp examination)
- vi. Osseous lesion such as sphenoid dysplasia/pseudoarthrosis
- vii. Family history in first-degree relative.

8. Neurological Disorders

- | | |
|---|----------------------------------|
| A. Arnold-Chiari malformation | G. Motor neurone disease |
| B. Brainstem hemorrhage | H. Multiple sclerosis |
| C. Frontal lobe abscess | I. Normal pressure hydrocephalus |
| D. Guillain-Barre syndrome | J. Petit mal epilepsy |
| E. Idiopathic intracranial hypertension | K. Subdural hematoma |
| F. Meningitis | |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 37-year-old engineer who was started on diuretics 2 months ago for hypertension attended for follow-up. His blood pressure was 190/110 mmHg. Within 24 hours he was admitted to ER with vomiting, acute vertigo and gross incoordination. On examination there was bilateral nystagmus.
2. A 78-year-old hypertensive woman is referred for fluctuating level of consciousness. On examination her blood pressure is 175/110 mmHg, fundus examination shows some hypertensive changes, her reflexes are bilaterally brisk and her plantars are upgoing.
3. A 26-year-old presents with a week's history of headache and diplopia. On examination she is obese and fundoscopy shows bilateral papilledema.
4. A 28-year-old man presents with sudden blurring of the left eye. A week earlier he had noted progressive clumsiness of the right hand. A few months earlier he had had an episode of left leg stiffness that resolved spontaneously.
5. A 19-year-old soldier is brought semiconscious to ER. He has been complaining of severe headache and vomiting for a day. On examination there is widespread maculopapular rash all over his body.

Answers: B K E H F

1. A 37-year-old engineer who was started on diuretics 2 months ago for hypertension attended for follow-up. His blood pressure was 190/110 mmHg. Within 24 hours he was admitted to ER with vomiting, acute vertigo and gross incoordination. On examination there was bilateral nystagmus.

Answer is B: Hypertension is a risk factor for brainstem hemorrhage. Nystagmus, vertigo and incoordination point towards brainstem/ cerebellar pathology.

2. A 78-year-old hypertensive woman is referred for fluctuating level of consciousness. On examination her blood pressure is 175/110 mmHg, fundus examination shows some hypertensive changes, her reflexes are bilaterally brisk and her plantars are upgoing.

Answer is K: Subdural hematoma may be acute, subacute or chronic. Loss of consciousness or fluctuating levels of consciousness is a common feature.

3. A 26-year-old presents with a week's history of headache and diplopia. On examination she is obese and fundoscopy shows bilateral papilledema.

Answer is E: Idiopathic intracranial hypertension is defined as raised intracranial pressure in the absence of a mass lesion or of hydrocephalus. The condition appears to be due to impaired cerebrospinal fluid absorption from the subarachnoid space across the arachnoid villi into the dural sinuses. Prompt recognition and treatment are needed to prevent potentially permanent visual loss. It is most frequently occurs in obese women of childbearing age.

4. A 28-year-old man presents with sudden blurring of the left eye. A week earlier he had noted progressive clumsiness of the right hand. A few months earlier he had had an episode of left leg stiffness that resolved spontaneously.

Answer is H: Multiple sclerosis takes several forms, with new symptoms occurring either in discrete attacks (relapsing forms) or slowly accumulating over time (progressive forms). Between attacks, symptoms may fully resolve, but permanent neurological problems often occur, especially as the disease advances.

5. A 19-year-old soldier is brought semiconscious to ER. He has been complaining of severe headache and vomiting for a day. On examination there is widespread maculopapular rash all over his body.

Answer is F: In practice, fever, headache and rash mean meningitis until proven otherwise.

9. Neurological Disorders

- | | |
|-------------------------------------|----------------------------------|
| A. Arnold-Chiari malformation | G. Multiple sclerosis |
| B. Benign intracranial hypertension | H. Myasthenia gravis |
| C. Guillain-Barre syndrome | I. Normal pressure hydrocephalus |
| D. Herpes simplex encephalitis | J. Peripheral neuritis |
| E. Lateral medullary syndrome | K. Sagittal sinus thrombosis |
| F. Motor neurone disease | |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 35-year-old clerk presents with diplopia and fatigue. Her symptoms are worse towards the evening.

2. A 33-year-old carpenter presents with unsteadiness of gait, incoordination of both arms and oscillopsia on down gaze. Clinical examination demonstrates a low hairline, positive Romberg's test and bilateral extensor plantars.

3. A 40-year-old woman presents with increasing weakness and stiffness of her legs. Three years ago she had had a similar episode, which lasted a few days and resolved on its own. A year later, she developed diplopia for 2 weeks.

4. A 70-year-old man presents with urinary incontinence and poor muscle coordination. On examination he is slightly confused, but afebrile and there is no papilledema. Two years ago he had meningitis which was successfully treated by antibiotics.

5. A previously fit 60-year-old lawyer is admitted to A&E with a 3-day history of progressively bizarre and aggressive behaviour. On examination she is confused and pyrexial. EEG shows abnormal complexes over the temporal lobe.

Answers: H A G I D

1. A 35-year-old clerk presents with diplopia and fatigue. Her symptoms are worse towards the evening.

Answer is H: Myasthenia gravis is an autoimmune neuromuscular disease leading to fluctuating muscle weakness and fatiguability. It is an autoimmune disorder in which weakness is caused by circulating antibodies that block acetylcholine receptors at the postsynaptic neuromuscular junction, inhibiting the stimulative effect of the acetylcholine. Myasthenia is treated medically with cholinesterase inhibitors or immunosuppressants, and, in selected cases, thymectomy.

2. A 33-year-old carpenter presents with unsteadiness of gait, incoordination of both arms and oscillopsia on down gaze. Clinical examination demonstrates a low hairline, positive Romberg's test and bilateral extensor plantars.

Answer is A: Diagnosis of Arnold-Chiari malformation is made through a combination of patient history, neurological examination and MRI.

3. A 40-year-old woman presents with increasing weakness and stiffness of her legs. Three years ago she had had a similar episode, which lasted a few days and resolved on its own. A year later, she developed diplopia for 2 weeks.

Answer is G: Multiple sclerosis is an inflammatory disease in which myelin sheaths in the brain and spinal cord are damaged, leading to demyelination and scarring, as well as a broad spectrum of signs and symptoms. During symptomatic attacks, administration of high doses of intravenous methylprednisolone is the routine therapy for acute relapses. Consequences of severe attacks which do not respond to corticosteroids might be treated by plasmapheresis. Disease modifying treatments include interferon, glatiramer, mitoxantrone and natalizumab.

4. A 70-year-old man presents with urinary incontinence and poor muscle coordination. On examination he is slightly confused, but afebrile and there is no papilloedema. Two years ago he had meningitis which was successfully treated by antibiotics.

Answer is I: NPH is a chronic type of communicating hydrocephalus whereby the increase in intracranial pressure due to accumulation of cerebrospinal fluid becomes stable and the formation of CSF equilibrates with absorption. Because of this equilibration, patients do not exhibit the classic signs of increased intracranial pressure, such as nausea, vomiting, headache or impaired consciousness. Patients exhibit the classic triad of gait difficulties, urinary incontinence and mental decline.

5. A previously fit 60-year-old lawyer is admitted to A&E with a 3-day history of progressively bizarre and aggressive behaviour. On examination she is confused and pyrexial. EEG shows abnormal complexes over the temporal lobe.

Answer is D: HSE is an acute or subacute illness, causing both general and focal signs of cerebral dysfunction. Although the presence of fever, headache, behavioral changes, confusion, focal neurological findings and abnormal CSF findings are suggestive of HSE, no pathognomonic clinical findings reliably distinguish HSE from other neurological disorders with similar presentations.

10. Gait

- | | |
|-------------------------|-------------------------|
| A. Alzheimer's dementia | G. Pick's dementia |
| B. cerebellar ataxia | H. psychogenic gait |
| C. femoral nerve injury | I. sciatic nerve injury |
| D. Huntington's disease | J. sensory ataxia |
| E. myopathic gait | K. spastic gait |
| F. Parkinson's disease | L. Sydenham's chorea |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 65-year-old man with a festinant, shuffling gait.

☐

2. A 60-year-old woman walks with a drop foot and high-stepping gait shortly after hip replacement.

☐

3. A 65-year-old man presents after a stroke with a stiff right leg that drags for-ward in an arc.

☐

4. A broad-based high-stepping gait in a known alcoholic.

☐

5. A broad-based unstable gait with veering to the right side.

☐

Answers: F I K J B.

1. A 65-year-old man with a festinant, shuffling gait.

Answer is F: There is a characteristic fixed stoop with reduced arm swing while walking. As a result of the impairment of righting reflexes, sufferers are sometimes observed to fall stiffly 'like a tree' without putting their arms out to break the fall.

2. A 60-year-old woman walks with a drop foot and high-stepping gait shortly after hip replacement.

Answer is I: Sciatic nerve is derived from the anterior primary rami of L4, L5, S1, S2 and S3, and divides into the common peroneal and tibial nerves about two-thirds of the way down the thigh. Sciatic nerve injury is an important postoperative complication of hip replacement and can result from direct trauma or traction on the nerve. There is lack of sensation over the lateral leg below the knee (and the entire sole of the foot) and inability to dorsiflex or evert the foot.

3. A 65-year-old man presents after a stroke with a stiff right leg that drags forward in an arc.

Answer is K: Strokes give rise to upper motor neuron lesions with weakness in a pyramidal distribution. The combination of spasticity in the leg extensors and weakness worse in the flexors of the lower limb gives rise to this spastic gait characterized by a stiff circum-ducted leg.

4. A broad-based high-stepping gait in a known alcoholic.

Answer is J: Sensory ataxia results from a loss of proprioception caused by peripheral neuropathy (in this case secondary to alcohol abuse). Romberg's test is used to identify proprioceptive sensory loss by demonstrating loss of postural control in darkness. The patient is asked to stand with the feet together and to close his or her eyes. If the patient is unstable, the test is said to be positive. These patients sway and fall because they rely heavily on visual cues to maintain postural equilibrium. This test is not pathognomonic of proprioceptive loss because patients with bilateral vestibular damage and some patients with cerebellar disease require visual cues to keep their balance.

5. A broad-based unstable gait with veering to the right side.

Answer is B: Cerebellar disease affecting one hemisphere tends to cause the patient to veer towards the side of the lesion. If cerebellar disease affects the cerebellar midline vermis, there is truncal ataxia giving rise to difficulty in standing and even sitting on a stool unsupported. There is lack of sensation over the lateral leg below the knee (and the entire sole of the foot) and inability to dorsiflex or evert the foot.

11. Falls and loss of consciousness

- | | |
|--------------------------|-----------------------------|
| A. anxiety attack | G. micturition syncope |
| B. carotid sinus syncope | H. postural hypotension |
| C. drop attack | I. Stoke s-Adams attack |
| D. epilepsy | J. vasovagal syncope |
| E. hypoglycaemia | K. vertebrobasilar ischemia |
| F. Meniere's disease | |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 70-year-old man complains of several blackouts and falls every day. The black-out lasts for several seconds and is preceded by palpitations.
2. A 65-year-old woman presented with attacks of sudden weakness of the legs causing her to fall to the ground. There is no loss of consciousness or confusion afterwards. She has not had any attacks for several months now.
3. A 21-year-old student presents with hyperventilation, tachycardia and light-headedness and is brought to ER after 'blacking out'.
4. A 34-year-old woman falls to the ground after hearing some bad news.
5. A 60-year-old woman who has recently started antihypertensive medication has a fall after getting out of bed.

Answers: I C A J H

1. A 70-year-old man complains of several blackouts and falls every day. The blackout lasts for several seconds and is preceded by palpitations.

Answer is I: A Stokes-Adam attack is caused by transient arrhythmias that decrease cardiac output sufficient to cause syncope. Both tachycardias and bradycardia may be responsible. Recovery is typically quick. The patient is characteristically pale with the syncope and becomes flushed upon recovery.

2. A 65-year-old woman presented with attacks of sudden weakness of the legs causing her to fall to the ground. There is no loss of consciousness or confusion afterwards. She has not had any attacks for several months now.

Answer is C: There should be no loss of consciousness in drop attacks. The cause is unclear and they usually resolve spontaneously.

3. A 21-year-old student presents with hyperventilation, tachycardia and light-headedness and is brought to ER after 'blacking out'.

Answer is A: Hyperventilation leads to a reduction in the $PaCO_2$ and a respiratory alkalosis.

Hypocapnic induced cerebral vessel vasoconstriction gives rise to the light-headedness and 'blacking out'. Hyperventilation may be an appropriate response to a metabolic acidosis or as a response to primary CNS pathology affecting the brain stem.

Hyperventilation can also occur as a means to increase PaO_2 in a patient with asthma, chronic obstructive pulmonary disease (COPD), etc.

In this case hyperventilation has been provoked by anxiety and is characteristically associated with symptoms of lightheadedness, and circumoral and distal Paraesthesia. When a patient presents with a symptom of 'blacking out', it is important to find out exactly what he or she means by that term, i.e. loss of vision or loss of consciousness.

4. A 34-year-old woman falls to the ground after hearing some bad news.

Answer is J: Vasovagal syncope results from reflex bradycardia and peripheral vasodilatation in response to pain, emotion or prolonged standing. The patient may later report symptoms of nausea and closing of the visual fields before collapse. The patient is unconscious for around 2 min and recovery is rapid in the supine position.

5. A 60-year-old woman who has recently started antihypertensive medication has a fall after getting out of bed.

Answer is H: Antihypertensive medication is a common cause of postural hypotension particularly in elderly people. This may occur as a result of hypovolemia and/or autonomic dysfunction, e.g. diuretics may cause hypovolemia and β blockers affect the autonomic nervous system. Other drug causes of autonomic dysfunction include L-dopa and tricyclic antidepressants.

12. Site of neurological lesion

- | | |
|------------------------------|-----------------------------------|
| A. Bilateral nerve VI lesion | H. Medial longitudinal fasciculus |
| B. Caudate nucleus | (MLF) |
| C. Dominant temporal lobe | I. Non dominant temporal lobe |
| D. Frontal lobe | J. Right cerebellar lobe |
| E. Left cerebellar lobe | K. Right occipital lobe |
| F. Left occipital lobe | L. Right parietal lobe |
| G. Left parietal lobe | M. Substantia nigra |

For each clinical scenario below, give the most likely cause for the clinical findings. Each option may be used only once.

1. A 75-year-old, right-handed woman is noted to ignore stimuli on the left side of her body.
2. A 65-year-old woman with suspected dementia is noted to be aggressive and sexually disinhibited.
3. A 65-year-old man has been unable to understand the ward staff over the last few days and speaks fluently in jargon that cannot be understood. His speech and language were previously normal.
4. A 34-year-old woman with multiple sclerosis is found to have bilateral internuclear ophthalmoplegia.
5. A 41-year-old man presents with dementia and irregular jerky movements of the trunk and limbs. His father suffered from a similar problem.

Answers: L D G H B

1. A 75-year-old, right-handed woman is noted to ignore stimuli on the left side of her body.

Answer is L: This patient has sensory neglect suggesting a non-dominant hemisphere lesion. As the patient is right handed, we know that the dominant lobe must be on the left side, and hence the pathology is in the right parietal lobe. The non-dominant lobe is largely responsible for visuospatial skills and this is reflected in the signs encountered, e.g. visual agnosia, dressing apraxia, constructional apraxia.

2. A 65-year-old woman with suspected dementia is noted to be aggressive and sexually disinhibited.

Answer is D: Socially and sexually disinhibited behaviour is a feature of frontal lobe lesions. Other signs include apathy, emotional lability, incontinence and perseveration.

3. A 65-year-old man has been unable to understand the ward staff over the last few days and speaks fluently in jargon that cannot be understood. His speech and language were previously normal.

Answer is G: This man is exhibiting signs of Wernicke's receptive dysphasia. His comprehension is impaired and his speech is fluent but full of jargon (that he is oblivious to). Look out for neologisms (in the absence of psychosis). A lesion in Broca's area (located in the dominant frontal lobe) gives rise to an expressive dysphasia, i.e. non-fluent speech with intact comprehension.

4. A 34-year-old woman with multiple sclerosis is found to have bilateral internuclear ophthalmoplegia.

Answer is H: Bilateral internuclear ophthalmoplegia is almost exclusively found in multiple sclerosis and is caused by bilateral involvement of the MLF. When the patient is asked to look towards the right, the left eye fails to adduct and the right eye develops coarse nystagmus in abduction. This is caused by the left MLF lesion.

When the patient is asked to look towards the left, the right eye fails to adduct and the left eye develops coarse nystagmus in abduction. This is caused by the right MLF lesion.

5. A 41-year-old man presents with dementia and irregular jerky movements of the trunk and limbs. His father suffered from a similar problem.

Answer is B: This is a presentation of Huntington's disease, an autosomal dominant condition, which usually presents in middle age. Pathologically, there is progressive degeneration of the striatum (caudate nucleus and putamen) and cerebral cortex

13. Antiepileptic drug therapy

- | | |
|------------------|---------------------|
| A. Carbamazepine | G. Phenobarbitone |
| B. Diazepam | H. Phenytoin |
| C. Ethosuximide | I. Primidone |
| D. Gabapentin | J. Sodium valproate |
| E. Lamotrigine | K. Tiagabine |
| F. Paraldehyde | L. Vigabatrin |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 45-year-old woman on antiepileptic therapy complains of acne and increased facial hair growth. She is on no other medication. ☐
2. A 25-year-old man presents with visual field defects 2 months after starting a new anticonvulsant therapy. ☐
3. A 21-year-old woman presenting with status epilepticus complains of rectal irritation after being given an antiepileptic medication per rectum. ☐
4. A 32-year-old woman on treatment for temporal lobe epilepsy complains of tremor, drowsiness and thinning hair. She is found to have mildly raised liver enzyme levels. ☐
5. A 24-year-old man who has recently started adjunctive antiepileptic therapy complains of a rash with blisters in the mouth and flu symptoms. ☐

Answers: H L F J E

1. A 45-year-old woman on antiepileptic therapy complains of acne and increased facial hair growth. She is on no other medication.

Answer is H: Phenytoin toxicity is associated with a 'cerebellar syndrome' (ataxia, nystagmus, intention tremor). Skin and collagen changes, including acne, hirsutism and gum hypertrophy, have led to Phenytoin becoming an unpopular drug, especially among younger patients. Phenytoin may also cause a folate-deficiency macrocytic anaemia.

2. A 25-year-old man presents with visual field defects 2 months after starting a new anticonvulsant therapy.

Answer is L: Vigabatrin is reserved for the treatment of epilepsy that is not satisfactorily controlled by other drugs. It has also been used as monotherapy in the treatment of West's syndrome (infantile spasms). Visual field defects are common and careful monitoring for this adverse effect is required. Unfortunately, in many cases these defects can persist even after treatment is discontinued.

3. A 21-year-old woman presenting with status epilepticus complains of rectal irritation after being given an antiepileptic medication per rectum.

Answer is F: Intravenous benzodiazepines are the usual first-line drug treatment of choice in status epilepticus. Paraldehyde is a useful drug for the treatment of status epilepticus because it causes little respiratory depression. It is associated with rectal irritation when delivered rectally as an enema. Diazepam injected intravenously is associated with a high risk of venous thrombophlebitis and so emulsion preparations are available to limit this.

Intravenous Lorazepam is also a popular choice in the treatment of major status epilepticus. It has the advantage of a longer duration of action than diazepam but it also has a slower onset of action.

4. A 32-year-old woman on treatment for temporal lobe epilepsy complains of tremor, drowsiness and thinning hair. She is found to have mildly raised liver enzyme levels.

Answer is J: Sodium valproate inhibits the activity of cytochrome P450 enzymes and thus will potentiate the activity of any drugs that are metabolized by these enzymes. Liver function must be monitored before and during the first few months of therapy. Valproate is contraindicated in active liver disease.

5. A 24-year-old man who has recently started adjunctive antiepileptic therapy complains of a rash with blisters in the mouth and flu symptoms.

Answer is E: Patients being treated with lamotrigine are warned to seek medical advice if a rash or flu-like symptoms develop. The risk of developing skin problems such as Stevens-Johnson syndrome and toxic epidermal necrolysis may be increased if lamotrigine is used with sodium valproate.

14. Treatment of headache

- | | |
|---|-----------------|
| A. Acetazolamide | G. Morphine |
| B. Amitriptyline | H. Paracetamol |
| C. Carbamazepine | I. Pethidine |
| D. Evacuation via burr hole | J. Prednisolone |
| E. High-dose aspirin and metoclopramide | K. Propranolol |
| F. Hydrocortisone | L. Sumatriptan |
| | M. Timolol |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

- A 52-year-old man with ischaemic heart disease requires treatment for an acute migraine attack that has not responded to paracetamol. ☐
- A 75 year old has a headache and painful red congested eye with a dilated non-responsive pupil. ☐
- A 65-year-old woman presents with a headache that has lasted a few weeks. She gets pain in her mouth during meals and her scalp is tender on palpation. ☐
- A 70-year-old woman requiring treatment for troubling trigeminal neuralgia. ☐
- A 29-year-old man with a skull fracture is suffering from very severe pain overlying the laceration to his head. He has been admitted for overnight observation. ☐

Answers: E A J C H

1. A 52-year-old man with ischaemic heart disease requires treatment for an acute migraine attack that has not responded to paracetamol.

Answer is E: Aspirin and metoclopramide provide relief for the symptoms of pain and nausea/vomiting associated with migraine. The use of serotonin 5HT₁ agonists such as sumatriptan is indicated if the patient fails to respond to conventional analgesics.

Remember that the 5HT₁ agonists are contraindicated in patients with coronary artery disease, previous myocardial infarction (MI) and uncontrolled hypertension.

2. A 75 year old has a headache and painful red congested eye with a dilated non-responsive pupil.

Answer is A: This is a presentation of acute glaucoma and is a medical emergency because there is a risk of blindness. The symptoms are often precipitated/made worse by the dark. The severe pain can lead to nausea and vomiting. Acetazolamide acts by decreasing the formation of aqueous humor. After the intraocular pressure has been reduced, surgical intervention in the form of peripheral iridectomy can prevent recurrence.

3. A 65-year-old woman presents with a headache that has lasted a few weeks. She gets pain in her mouth during meals and her scalp is tender on palpation.

Answer is J: Her symptoms and signs are suggestive of temporal/giant cell arteritis (GCA). The erythrocyte sedimentation rate (ESR) is characteristically very high in this condition. Treatment of choice is high-dose oral prednisolone. Skip lesions occur in temporal arteritis and so a negative temporal artery biopsy is not an indication to stop treatment in the face of high clinical suspicion of GCA.

4. A 70-year-old woman requiring treatment for troubling trigeminal neuralgia.

Answer is C: Carbamazepine is commonly used to treat trigeminal neuralgia. Phenytoin and gabapentin have also been used to treat this condition. Cases refractory to medical treatment may be considered for surgery.

5. A 29-year-old man with a skull fracture is suffering from very severe pain overlying the laceration to his head. He has been admitted for overnight observation.

Answer is H: Morphine causes pupillary constriction and should not be given as analgesia in this case of head injury because it will interfere with neurological observations.

15. Treatment of Parkinson's disease

- | | |
|------------------|-------------------|
| A. Amantadine | H. Entacapone |
| B. Apomorphine | I. Haloperidol |
| C. Benzhexol | J. Metoclopramide |
| D. Bromocriptine | K. Nortriptyline |
| E. Carbidopa | L. Ondansetron |
| F. Clozapine | M. Thalamotomy |
| G. Domperidone | |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. Improvement of tremor in a 70-year-old patient with Parkinson's disease on treatment with levodopa.

☐

2. Control of vomiting in a patient being treated for Parkinson's disease.

☐

3. A 65-year-old man with Parkinson's disease cannot tolerate levodopa-based therapy despite careful titration.

☐

4. A patient on therapy for Parkinson's disease requires urgent treatment for acute psychosis.

☐

5. A 75-year-old man with severe Parkinson's disease with symptoms that remains uncontrolled on maximum oral therapy.

☐

Answers: C G D F B

1. Improvement of tremor in a 70-year-old patient with Parkinson's disease on treatment with levodopa.

Answer is C: Benzhexol is a muscarinic acetylcholine receptor antagonist that is useful in treatment of parkinsonian tremor. Such anti-muscarinic are useful in treating tremor and rigidity, and in reducing sialorrhea, but they have little effect on bradykinesia.

2. Control of vomiting in a patient being treated for Parkinson's disease.

Answer is G: Domperidone is the antiemetic of choice because it does not penetrate the blood-brain barrier and can be given with centrally acting dopamine agonists to counteract their emetogenic effect.

3. A 65-year-old man with Parkinson's disease cannot tolerate levodopa-based therapy despite careful titration.

Answer is D: Bromocriptine is a dopamine receptor agonist and is indicated if levodopa therapy is felt to be no longer adequate or if the patient cannot tolerate levodopa therapy. The use of bromocriptine is limited by its adverse effects, which include hypotension and fibrotic reactions, e.g. pulmonary fibrosis.

4. A patient on therapy for Parkinson's disease requires urgent treatment for acute psychosis.

Answer is F: The dose of the responsible anti-parkinsonian drug should be reduced. Clozapine is an atypical antipsychotic and is thus preferred to the typical antipsychotics which have more marked extrapyramidal side effects.

5. A 75-year-old man with severe Parkinson's disease with symptoms that remains uncontrolled on maximum oral therapy.

Answer is B: Apomorphine by subcutaneous injection/infusion is indicated if motor symptoms of Parkinson's disease remain refractory to maximal therapy with levodopa and other anti-parkinsonian drugs. Hospital admission is required for initiation of treatment. Adverse effects of nausea and vomiting are very common and so pre-treatment with domperidone is standard.

Short Heading Questions (SHQs)

1- Which is not a symptom of raised intracranial tension:

- A. Altered consciousness
- B. Headache
- C. Non-projectile vomiting
- D. Convulsions
- E. Blurring of vision

2- Which is not a feature of 'stage of neural shock' in hemiplegia:

- A. Retention of urine
- B. Coma
- C. Absent deep jerks
- D. Hypertonia
- E. Extensor planter response

3- Crossed hemiplegia indicates the site of lesion in:

- A. Internal capsule
- B. Cortex
- C. Cervical spine
- D. Brainstem
- E. Basal ganglia

4- Which is not a feature of UMN palsy:

- A. Spasticity
- B. Babinski's sign
- C. Clonus
- D. Fasciculations
- E. Hyperreflexia

5- Which is not a test for cortical sensory function:

- A. Perceptual rivalry
- B. Graphesthesia
- C. Vibration sensation
- D. Two point localization
- E. Stereognosis

6- In monoplegia, usually the site of lesion lies in:

- A. Pons
- B. Internal capsule
- C. Cortex
- D. Midbrain
- E. Thalamus

7- All are features of pontine hemorrhage except:

- A. Disconjugate gaze
- B. Pin-point pupil
- C. Hypothermia
- D. Paralysis
- E. Coma

8- All of the following are sources of cerebral embolism except:

- A. Tricuspid incompetence with occasional ectopics
- B. Left ventricular aneurysm
- C. Left atrial myxoma
- D. Subacute bacterial endocarditis
- E. Fracture of long bone

9- All of the following may produce syncope except:

- A. Cardiac tamponade
- B. Tight aortic stenosis
- C. Stokes-Adams syndrome
- D. Arrhythmia
- E. Basilar artery migraine

10- Regarding acute transverse myelitis which is false:

- A. Viral or post-vaccinal
- B. Bladder involvement is very late
- C. Definite upper level of sensory loss
- D. Absence of root pain
- E. Flaccid paralysis

11- Spastic paraplegia is not produced by:

- A. Guillain-Barre syndrome
- B. Cord compression
- C. Ant. spinal artery occlusion
- D. Transverse myelitis
- E. Ependymoma

12- Regarding cerebral edema all is true except:

- A. Treated by IV Lasix
- B. Is not associated with headache.
- C. Associated with CVS
- D. Treated by IV mannitol
- E. Associated with papilledema

13- Management of choice in Guillain-Barre syndrome is:

- A. Immunoglobulin
- B. Cyclophosphamide
- C. Corticosteroid
- D. Interferon
- E. Plasmapheresis

14- All of the following produce mononeuritis multiplex except:

- A. Polyarteritis nodosa
- B. Sarcoidosis
- C. Rheumatoid arthritis
- D. Infectious mononucleosis
- E. Leprosy

15- Sensory involvement is not found in:

- A. Encephalitis
- B. Myelopathy
- C. Neuropathy
- D. Myopathy
- E. Radiculopathy

16- Romberg's sign is present in:

- A. Cerebellar ataxia
- B. Labyrinthine ataxia
- C. Apraxia
- D. Sensory ataxia
- E. Ataxia-telangiectasia

17- Intermittent bulbar palsy is seen in:

- A. Snake bite
- B. Myasthenia gravis
- C. Rabies
- D. Poliomyelitis
- E. Motor neurone disease

18- Which of the following does not produce wasting of small muscles of hands?

- A. Myopathy
- B. Rheumatoid arthritis
- C. Cervical rib
- D. Carpal tunnel syndrome
- E. Pancoast tumor

19- Fine tremor is found in

- A. Cerebellar disorder.
- B. Parkinsonism
- C. Thyrotoxicosis
- D. Wilson's disease
- E. Pernicious anemia

20- Flapping tremor is not found in:

- A. Raised intracranial tension
- B. Hepatocellular failure
- C. Hypnotic poisoning
- D. Uremia
- E. CO₂ retention

21- Horner's syndrome includes all of the following except:

- A. Absent corneal reflex
- B. Constricted pupil.
- C. Anhidrosis
- D. Enophthalmos
- E. Partial ptosis

22- Corneal reflex tests the integrity of:

- A. Optic nerve
- B. Oculomotor nerve
- C. Trochlear nerve
- D. Trigeminal nerve
- E. Abducent nerve

23- All of the following may produce papilledema except:

- A. Guillain-Barre syndrome
- B. Malignant hypertension
- C. Cavernous sinus thrombosis
- D. Hypoxia
- E. Vitamin A intoxication

24- Commonest cause of abducent nerve palsy is:

- A. Brain tumour
- B. Diabetes mellitus
- C. Raised intracranial tension
- D. Gradenigo's syndrome
- E. Wernicke's encephalopathy

25- True hypertrophy of muscles is found in all except:

- A. Duchenne type muscular
- B. Manual laborers dystrophy
- C. Myotonia
- D. Athletes
- E. Acromegaly

26- Inversion of Supinator jerk indicates the lesion at:

- A. C3,4
- B. C4,5
- C. C5,6
- D. C6,7
- E. C8/T1

27- Vibration sensation is lost early in:

- A. Leprosy
- B. Alcoholic polyneuropathy
- C. Diabetes mellitus
- D. Multiple sclerosis
- E. Beriberi

28- Ptosis with dilated pupils is observed in:

- A. Horner's Syndrome.
- B. Myasthenia Gravis.
- C. Oculomotor Palsy.
- D. Botulism.
- E. Trochlear Palsy

29- Which is false regarding migraine?

- A. Hereditary predisposition
- B. Always above 50 years
- C. Common in women
- D. Hemispheric headache
- E. Prominent autonomic symptoms

30- MRI is preferred over CT scan of brain in all except:

- A. Posterior fossa tumors
- B. Multiple sclerosis
- C. Pituitary tumors
- D. Calcification within a lesion
- E. Syringomyelia

31- Transient ischaemic attack (TIA) stamps the process as:

- A. Embolic
- B. Demyelinating
- C. Hemorrhagic
- D. Inflammatory
- E. Vasospasm

32- Which organism commonly produces meningitis in an adolescent?

- A. E. coli
- B. Pneumococcus
- C. Meningococcus
- D. H. influenza
- E. Staphylococcus

33- Tensilon test improves the muscle weakness in:

- A. Motor neuron disease
- B. Myopathy
- C. Myasthenia gravis
- D. Polymyositis
- E. Periodic paralysis

34- Which of the following is not a feature of syringobulbia?

- A. Spastic tongue
- B. Dysphagia
- C. Nasal regurgitation
- D. Dysarthria
- E. Loss of facial sensation

35- Which of the following produces wrist drop?

- A. Poliomyelitis
- B. Carpal tunnel syndrome
- C. Syringomyelia
- D. Radial nerve palsy
- E. Ulnar nerve compression

36- Which does not produce wasting of small muscles of hands?

- A. Duchenne muscular
- B. Thoracic inlet syndrome dystrophy
- C. Rheumatoid arthritis
- D. Amyotrophic lateral sclerosis
- E. Diabetes

37- Disorder of language of cerebral origin is:

- A. Dysarthria
- B. Dysphonia
- C. Aphasia
- D. Monotonous speech
- E. Staccato speech

38- All are characteristic of LMN lesion EXCEPT:

- A. Weakness and wasting
- B. Absent superficial reflex
- C. Flexor plantar response
- D. Brisk deep reflexes
- E. Flaccidity of muscles

39- Thrombosis of left middle cerebral artery may give rise to:

- A. Diplopia
- B. Paralysis of conjugate gaze towards left
- C. Right homonymous hemianopia
- D. Hemiplegia of the right side where affection of leg is more than arm
- E. Right monocular loss of vision

40- Anterior horn cell disease is:

- A. Myasthenia gravis
- B. Progressive muscular atrophy
- C. Tabes dorsalis
- D. Botulism
- E. Diphtheria

41- Charcot (neuropathic) joint is a recognized complication of all except:

- A. Diabetes mellitus
- B. Tabes dorsalis
- C. Syringomyelia
- D. Friedreich's ataxia
- E. Leprosy

42- Unilateral ptosis is characteristic of all except:

- A. Cavernous sinus thrombosis
- B. Cluster headache
- C. Bell's palsy
- D. Syringobulbia
- E. Horner's syndrome

43- Which is not a recognized feature of cerebellar dysfunction?

- A. Hypermetria
- B. Dysdiadochokinesis
- C. Hypertonia
- D. Titubation
- E. Nystagmus

44- A lesion of the occipital lobe causes:

- A. Acalculia
- B. Astereognosis
- C. Constructional apraxia
- D. Cortical blindness
- E. Visuospatial neglect

45- Psychiatric illness rather than an organic brain disorder is suggested by:

- A. Onset for the first time at the age of 55 years
- B. A family history of major psychiatric illness
- C. Impaired short term memory
- D. No previous history of psychiatric illness
- E. Clouding of consciousness

46- Which of the following features is characteristic of myasthenia gravis?

- A. Diplopia
- B. Equal sex incidence
- C. Fasciculation
- D. Lid lag
- E. Loss of pupillary reflexes

47- Which one of the following would support a diagnosis of subacute combined degeneration of the cord rather than multiple sclerosis?

- A. Absent ankle jerks
- B. Autonomic symptoms
- C. Cerebellar signs
- D. Extensor plantars
- E. Visual problems

48- The following are recognized features of Pancoast's tumour except:

- A. Ipsilateral Horner's syndrome
- B. Wasting of the dorsal interossei
- C. pain in the arm radiating to the fourth and fifth fingers
- D. Erosion of the first rib
- E. Weakness of abduction at the shoulder

49- Which of the following associations of muscles and nerve supply are NOT true:

- A. Triceps and C7
- B. Deltoid and C5
- C. Gastrocnemius and S 1
- D. Quadriceps and L3
- E. Long flexors of fingers and C6

50- Which of the following features are not compatible with the diagnosis of motor neurone disease?

- A. Dementia
- B. Dysphagia
- C. Muscle cramps
- D. Neck weakness
- E. Optic atrophy

51- A right carotid artery stenosis could not account for:

- A. Contralateral hemiplegia
- B. Contralateral hemisensory loss.
- C. Drop attacks
- D. Dysphasia
- E. Right amaurosis fugax.

52- A lesion of the facial nerve in the internal auditory meatus will NOT affect

- A. Taste
- B. sweating over the cheek
- C. lacrimation
- D. hearing
- E. blinking

Answer key:

- | | |
|-------|-------|
| 1- C | 31- A |
| 2- D | 32- C |
| 3- D | 33- C |
| 4- D | 34- A |
| 5- C | 35- D |
| 6- C | 36- C |
| 7- C | 37- A |
| 8- A | 38- D |
| 9- A | 39- C |
| 10- B | 40- B |
| 11- A | 41- D |
| 12- B | 42- C |
| 13- A | 43- C |
| 14- D | 44- D |
| 15- D | 45- B |
| 16- D | 46- A |
| 17- B | 47- A |
| 18- A | 48- E |
| 19- C | 49- E |
| 20- A | 50- E |
| 21- A | 51- C |
| 22- D | 52- B |
| 23- D | |
| 24- C | |
| 25- A | |
| 26- C | |
| 27- C | |
| 28- C | |
| 29- B | |
| 30- D | |

GASTROENTEROLOGY & HEPATOLOGY**Multiple Choice Questions (MCQs)**

1. A 25-year-old man with a 7-year history of ulcerative colitis complaining of the insidious onset of progressive fatigue, pruritus, and jaundice. Laboratory studies showed elevation of serum alkaline phosphatase that is not accompanied by significant elevations of aspartate aminotransferase (AST) or alanine aminotransferase (ALT). An anti-mitochondrial antibody test is negative. Endoscopic retrograde cholangiography demonstrates multiple short strictures and saccular dilations of the biliary tree, both in extrahepatic and intrahepatic sites. Liver biopsy demonstrates bile duct proliferation, periductal fibrosis, inflammation, and loss of bile ducts. **Which of the following is the most likely explanation for these findings?**

- A. Bile duct tumor
- B. Choledocholithiasis
- C. Congenital polycystic liver
- D. Primary biliary cirrhosis
- E. Primary sclerosing cholangitis

The correct answer is E. Primary sclerosing cholangitis is a condition in which fibrosing inflammation of the intrahepatic and extra hepatic bile duct system eventually lead to the obliteration of the bile ducts and development of cirrhosis. The clinical presentation illustrated in the question stem is typical. The association with inflammatory bowel disease, particularly ulcerative colitis, may provide a helpful clue, in some patients, AST and ALT may be mildly increased. The liver biopsy picture may be similar in primary sclerosing cholangitis and the related condition, primary biliary cirrhosis. The antimitochondrial antibody test can be helpful, because it is negative in primary sclerosing cholangitis and positive in roughly 95% of cases of primary biliary sclerosis. The most definitive study is endoscopic retrograde cholangiography, which establishes that the bile duct lesions extend outside the liver. Although a bile duct tumor (choice A) can cause a localized dilatation of the bile duct system proximal to the lesion, it would not produce the characteristic pattern of alternating saccular dilations and strictures seen in this patient with endoscopic retrograde cholangiography. Choledocholithiasis (choice B) is a stone in the extrahepatic bile duct system and would be seen on endoscopic retrograde cholangiography as a blockage to the flow of contrast dye. Congenital polycystic liver (choice C) is a rare condition that can produce massive hepatomegaly but usually causes surprisingly few medical problems. Primary biliary cirrhosis (choice D) can have a very similar biopsy appearance to primary sclerosing cholangitis. However, it does not have extrahepatic bile duct disease and usually is positive for antimitochondrial antibodies.

2. A 60-year-old man is admitted to ER with hematemesis. His pulse is 110/min, blood pressure is 100/60 mm Hg, and respirations are 19/min. He has multiple spider angiomas on his back and chest, with bilateral gynecomastia. Abdominal examination is significant for hepatosplenomegaly, and his abdomen is distended and ascites was detected on percussion. His hematocrit is 23%. After placement of a nasogastric tube, 400 mL of bright red blood is evacuated. After initial fluid resuscitation, **which of the following is the most appropriate next step in management?**

- A. Barium swallow
- B. Esophageal balloon tamponade
- C. Esophagogastrosocopy
- D. Exploratory celiotomy
- E. Selective angiography

The correct answer is C. The patient has signs of chronic liver disease, and now presents with an upper gastrointestinal bleed (UGIB). The sudden onset of hematemesis in the absence of abdominal pain in a patient with chronic liver disease is consistent with hemorrhage from esophageal varices. However, one half to two thirds of patients with cirrhosis who present with a UGIB has a non variceal source, and many have more than one source. Therefore, prompt identification of the origin of bleeding is crucial to guiding therapy. Esophagogastrosocopy is the appropriate first step in identifying, and in many cases treating, the source of bleeding.

3. A 22-year-old man presents with a 6-month history of non-bloody diarrhea, malaise, recurrent abdominal cramps, and temperature to 38.5°C. At this time, he is afebrile. Examination reveals a palpable, ill defined mass in the right lower quadrant of the abdomen. Palpation causes local tenderness without guarding. Oral ulcers are also noted. An upper gastrointestinal series with small bowel follow-through reveals a sharply demarcated stenotic segment in the terminal ileum. The patient undergoes laparotomy, and the involved segment of ileum is resected. **Which of the following is the most likely diagnosis?**

- A. Carcinoma
- B. Celiac disease
- C. Chronic appendicitis
- D. Crohn's disease
- E. Pseudomembranous colitis

The correct answer is D. The clinical picture is consistent with Crohn's disease (CD). Non bloody diarrhea, abdominal pain and cramps, malaise, and low-grade fever are the most common, but rather nonspecific, presenting symptoms. CD affects the terminal ileum most frequently, so that tenderness and a mass can often be detected on palpation in the lower left quadrant of the abdomen. The most characteristic signs of CD include sharp demarcation of affected segments from adjacent non-involved loops and presence of non-necrotizing granulomas in biopsies. Strictures resulting in bowel obstruction may necessitate surgical resection, as in this case.

4. A 75-year-old man has had acute, left-sided abdominal pain that started in the left iliac fossa. He suddenly passes stool mixed with dark blood clots. His temperature is 38.1°C, blood pressure is 110/85 mm Hg, pulse is 120/mm, and respirations are 18/min. abdominal examination demonstrates localized tenderness along the descending colon. An x-ray film taken after barium enema excludes intra-abdominal free air. The large bowel lumen is decreased and irregular, with mucosal thickening, and there is gas in the wall of the colon. **Which of the following is the most likely diagnosis?**

- A. Appendicitis
- B. Colon cancer
- C. Crohn disease
- D. Ischemic colitis
- E. Ulcerative colitis

The correct answer is D. This is the classic presentation of ischemic colitis. Patients are typically in the 6th to 8th decade of life, and can be of any race. In this condition, there is an inflammation of the colon resulting from ischemic damage to the colon wall. Classic x-ray findings are mucosal edema with associated hematoma formation. This is often referred to as thumb printing. Thickened edematous tissues encroach on air or contrast fluid lumen. Gas in the wall of the colon (pneumatosis coli) is highly suggestive of ischemic colitis. There are many possible causes of ischemic damage, including occlusion of a major artery or vein, small vessel disease, severe hypotension, and intestinal obstruction. Severe ischemic colitis usually requires surgical resection of the involved bowel segment. Appendicitis (**choice A**) involves the right lower quadrant of the abdomen. Colon cancer (**choice B**) would produce an ulcer or a mass visible on barium enema. Newly diagnosed Crohn's disease (**choice C**) or ulcerative colitis (**choice E**) would be unusual in a 75-year-old, and would produce larger areas of mucosal ulceration and irregularity on barium enema.

5. A 50-year-old man returns to his home after a trip to India. The day after his return, he complains of diarrhea, abdominal cramps, and nausea. His temperature is 37°C. His stools do not contain mucus or blood. Microscopic examination of a stool sample reveals no leukocytes. **Which of the following is the most likely pathogen?**

- A. Bacillus cereus
- B. Clostridium perfringens
- C. Escherichia coli
- D. Rotavirus
- E. Staphylococcus aureus

The correct answer is C. Traveling abroad often entails abrupt changes in diet and climate, as well as exposure to conditions of poor sanitation, all of which results in a high incidence of diarrhea. This is self-limiting and manifests with watery diarrhea and dehydration, but no fever or other signs of systemic infection. The most frequent cause of traveler's diarrhea is enterotoxigenic *Escherichia coli*. The remaining infectious agents with listed here are potential causes of non inflammatory diarrhea, which is not associated with blood and mucus in the stool, fever, systemic signs of infection, or fecal leukocytes. *Bacillus cereus* (**choice A**), *Clostridium perfringens* (**choice B**), and *Staphylococcus aureus* (**choice E**), along with enterotoxigenic *E. coli*, are the most common agents associated with food poisoning due to production of toxins. All these pathogens produce a similar clinical

picture of watery diarrhea, sometimes with nausea and vomiting, but no fever.

Rotavirus (**choice D**) is one of the most important infectious causes of diarrhea in infants and young children in developing countries. It may also cause diarrhea in adults exposed to infected children.

6. A 75-year-old man complains of abdominal pain. His temperature is 37°C, blood pressure is 110/65 mm Hg, pulse is 63/bpm, and respirations are 16/min. The abdomen is soft, with focal tenderness in the left lower quadrant. His erythrocyte count is 4.5 million/mm³, leukocyte count is 9000/mm³ with 60% neutrophils and 5% bands, and platelet count is 250,000/mm³. Which of the following is the most appropriate next step in diagnosis?

- A. Barium enema
- B. Colonoscopy
- C. CT of abdomen
- D. Plain film of abdomen
- E. Trial antibiotics and a liquid diet

The correct answer is E. The probable diagnosis is diverticulitis. The relatively mild symptoms, normal vital signs, and normal laboratory values in this patient indicate that he is not very ill. This means that he can be treated at home with rest, a liquid diet, and oral antibiotics, such as cephalexin. In this setting, the response to the therapeutic trial itself serves as a confirmatory test. In most cases, the symptoms will resolve rapidly on this regimen, and the diet can be gradually advanced to a soft, low-roughage diet. At approximately 1 month, a high-roughage diet is resumed. Seriously ill patients with diverticulitis are usually treated in the hospital and may require IV antibiotics. Surgery will be needed in only about 20% of these patients. Barium enema studies (**choice A**), typically with air contrast, can be performed if necessary at 2 weeks to confirm the presence of diverticulae. Colonoscopy (**choice B**) can be used alternatively to barium enema at 2 weeks to identify diverticulae and rule out other conditions, such as proctitis or colon cancer, which would not be as likely in this patient with mild symptoms. CT of the abdomen (**choice C**) is used in severe cases when the differential diagnosis includes pelvic abscess and appendicitis. Plain film of the abdomen (**choice D**) is of limited utility in this setting.

7. A 35-year-old man complains of chronic vague gastric pain of several years' duration. The pain is sometimes relieved by food. Serum immunoglobulin studies for IgG and IgA antibodies directed against *Helicobacter pylori* are strongly positive. Endoscopy with gastric antral biopsy demonstrates gastritis but no ulcerative lesions. *H. pylori* organisms are seen with special stains on the biopsy fragments. The patient is treated with a 1-week course of omeprazole (20 mg bid), plus clarithromycin and metronidazole (500 mg bid each). Which of the following is the most appropriate non invasive test to ensure *H. pylori* eradication?

- A. Culture of gastric biopsy
- B. Rapid urease test
- C. Repeat qualitative IgA and IgG antibodies against *H. pylori*
- D. Repeat quantitative IgA and IgG antibodies against *H. pylori*
- E. Urea breath test

The correct answer is E. The course of therapy is so short that IgG and IgA antibodies against *H. pylori* have not had time to decrease by the end of therapy. The urea breath test is a test in which the patient is given oral urea that has been labeled with C¹³ or C¹⁴. The *H. pylori* bacteria contain the enzyme urease and are able to metabolize the urea, producing radioactively labeled CO₂, which can be measured in breath samples taken 20-30 minutes after ingestion. It is recommended that this test be delayed until 4 weeks after the end of the regimen, since recent antibiotic use may have decreased the number of organisms enough to produce a negative test, without having achieved true eradication.

Culture of gastric biopsy (**choice A**) is highly specific but requires both endoscopic biopsy and fastidious culture technique. Therefore, this method is not often used clinically for follow-up studies. The rapid urease test (**choice B**) is performed on gastric tissue. It is rapid, specific, and sensitive, but requires endoscopy to obtain the biopsy fragment. Qualitative assays of antibodies against *H. pylori* (**choice C**) may be positive for up to 3 years after eradication of the infection. Quantitative assays of antibodies against *H. pylori* (**choice D**) drop slowly for up to 3 years after eradication of the infection.

8. A 50-year-old woman presents with dizziness when she gets out of bed in the morning. During the episodes of dizziness, she feels very warm and flushed. She admits to frequent episodes of abdominal cramping and severe watery diarrhea during the past year, and she recently began having dry, itchy skin. On physical examination, she has a 2/6 systolic murmur best heard at the left lower sternal border. No wheezing, rhonchi, or crackles are apparent on lung examination. Laboratory results are unremarkable. Which of the following is the most appropriate next step in diagnosis?

- A. Barium examination of the bowel
- B. Measurement of serum lipase and amylase levels
- C. Small bowel biopsy
- D. Ultrasound of the abdomen
- E. Urine analysis for 5-hydroxyindoleacetic acid

The correct answer is E. This woman has carcinoid syndrome. The classic triad of this disorder is flushing (present in 85%), watery diarrhea, and valvular heart disease. The first test for screening carcinoid syndrome is the determination of 5-HIAA (metabolite of serotonin, 5-HT) in a 24-hour urine sample (carcinoid patients may excrete more than 25 mg/day). Carcinoid syndrome is also associated with hypotension, bronchospasm, telangiectasia, and abdominal cramps due to the release of serotonin and vasoactive peptides, especially in bronchial carcinoid. There may also be a secondary niacin deficiency causing dermatitis, depression, and diarrhea. Symptomatic treatment of carcinoid syndrome consists of giving the synthetic peptide octreotide.

9. A 55-year-old man complains of weight loss and severe abdominal pain of several months' duration. The pain radiates to the mid-back and is slightly relieved when he assumes a bent forward position. On physical examination, the man appears emaciated, with mild jaundice. The liver edge is palpable and smooth. **Which of the following tests is the most appropriate next step in diagnosis?**

- A. Arteriography
- B. CT scan
- C. Endoscopic retrograde pancreatography
- D. MRI scan
- E. Ultrasound

The correct answer is B. Ductal carcinoma of the pancreas is often devastating because, in roughly 90% of cases, it presents late in the clinical course, when it is no longer resectable. Therefore, the first step when this disease is suspected on clinical grounds is a CT scan, which is now recommended as the most cost-effective method of both diagnosing and staging the tumor (i.e., determining whether it is potentially resectable). If unresectable disease is detected, then definitive tissue diagnosis (for choice of chemotherapy) can be made on the basis of CT-guided percutaneous needle aspiration or biopsy. If a potentially resectable lesion is identified, endoscopic ultrasound (not yet widely available) can be used to search for small metastatic lesions not visible with CT. MRI (choice D) is no more accurate than CT in detecting and staging pancreatic cancer, and is more expensive. Ultrasound (choice E) is still frequently used, but usually is followed by CT scan. Therefore, the current thinking is to eliminate this test and go directly to CT, since the ultrasound is less sensitive.

10. A patient presents with severe jaundice. Physical examination reveals a nodular, enlarged liver. One nodule is much larger than the others. CT of the abdomen confirms multinodular cirrhosis and demonstrates a 7-cm mass near the lower border of the liver. CT-guided biopsy of this mass shows a malignant tumor derived from hepatic parenchymal cells. **Which of the following risk factors is most strongly associated with this condition?**

- A. Aflatoxin exposure
- B. Hemochromatosis
- C. Hepatitis B virus infection
- D. Lead exposure
- E. Wilson disease

The correct answer is C. The tumor is a hepatocellular carcinoma, which usually develops in the setting of cirrhosis because of a variety of damaging agents. By far the most commonly implicated etiologic factor, is infection with hepatitis B or C. Other important risk factors include alcohol abuse, hemochromatosis, and aflatoxin exposure. Aflatoxin (choice A) is a fungal toxin found in contaminated bean products, including soy beans and soy products (e.g., soy sauce).

11. A 45-year-old woman complains of chronic fatigue. A review of systems reveals long-standing stomach problems characterized by slow digestion and delayed emptying of her stomach. A complete blood count demonstrates a moderately severe megaloblastic anemia. Autoantibodies to intrinsic factor are detected in the serum. **Which of the following a biopsy of the stomach is most likely to show?**

- A. Acute erosive gastritis.
- B. Gastric atrophy.
- C. Linitis plastica.
- D. Ménétrier's disease.
- E. Peptic ulcer.

The correct answer is B. The patient has pernicious anemia, in which gastric atrophy is associated with megaloblastic anemia due to vitamin B12 deficiency. Lack of intrinsic factor leaves the small bowel unable to absorb vitamin B12, leading to megaloblastic anemia.

12. A 61-year-old man, with an 8-year history of hepatitis C infection and well-documented cirrhosis and portal hypertension, presents with a large hematoma on his thigh. On preoperative screening, his prothrombin time is noted to be 17.4 seconds. **Transfusion of which of the following is the most appropriate next step in management of this patient prior to his procedure?**

- A. Cryoprecipitate
- B. Fresh frozen plasma
- C. Packed red blood cells
- D. Platelets
- E. Whole blood

The correct answer is B. Patients with liver disease have a deficiency of one or more clotting factors produced by the liver. Fresh frozen plasma (FFP) generally increases plasma anticoagulation factors by 30%. There is a correlation for prothrombin time greater than 15 and the risk of bleeding with invasive procedures such as paracentesis. For this reason, FFP is usually indicated in such patients prior to undergoing their procedure.

13. A 39-year-old shepherd complains of chronic abdominal pain. Physical examination is notable for a palpable liver mass. Ultrasound demonstrates a 15-cm cyst bearing multiple daughter cysts in the liver. **Which of the following is the most likely diagnosis?**

A. Ascariasis
B. Echinococcosis
C. Fascioliasis
D. Schistosomiasis
E. Toxocariasis

The correct answer is B. This is hydatid disease, due to infection with *Echinococcus granulosus* (rarely *Echinococcus multilocularis*).

14. A 55-year-old man has been known for many years to have liver cirrhosis secondary to hepatitis C, developed worsening jaundice, mild encephalopathy. Physical examination shows a nodular liver, CT scan demonstrates the presence of a solid tumor mass near the dome of the right lobe. **Which of the following is an additional useful diagnostic test in this patient?**

A. 5 hydroxy-indoleacetic acid (5HIAA).
B. Alpha-fetoprotein (AFP).
C. Carcino-embryogenic agent (CEA).
D. Hepatitis C titers.
E. Portal vein angiogram.

The correct answer is B. AFP is the blood marker for hepatocellular carcinoma, the tumor most likely to be present in this man. Although moderate elevations of the marker will occur just because of the cirrhosis, higher levels are virtually diagnostic for the tumor.

15. A 40-year-old man with a history of hypertriglyceridemia is brought to ER 3 hours following the abrupt onset of severe deep epigastric pain, nausea, and vomiting. The pain is steady and radiates to the back. The patient is agitated and has cool, clammy skin. His temperature is 38.5°C, blood pressure is 100/70 mm Hg, pulse is 110/bpm, and respirations are 22/min, abdominal examination reveals tenderness in the upper abdomen, without guarding. A plain x-ray film shows an air-filled intestinal loop in the left upper quadrant. Laboratory investigations show: Glucose 150 mg/dL, LDH 150 U/L, ALT 90U/L, AST 80 U/L, Amylase 120 U/L, Lipase 30 U/L, Calcium 7 mg/dL, C-reactive protein 1.2 mg/dL. **Which of the following is the most likely diagnosis?**

A. Acute cholecystitis
B. Acute hepatitis
C. Acute pancreatitis
D. Bowel perforation
E. Mesenteric ischemia

The correct answer is C. Although the whole clinical presentation is characteristic of acute pancreatitis, normal or slightly elevated serum levels of pancreatic enzymes seem to contrast with such a diagnosis. However, hypertriglyceridemia itself may often falsely depress amylase and lipase levels in the presence of otherwise typical clinical features of pancreatitis. Note, however, other classic laboratory and radiologic signs of acute pancreatitis present in this case: leukocytosis, hyperglycemia, hypocalcemia, elevated C-reactive protein, and the "sentinel loop" (air-filled loop of small bowel in the left upper quadrant). The latter parameter is often used as a radiologic marker of pancreatic damage.

16. A 31-year-old man is admitted to the hospital because of melena. He has no significant past medical history but takes daily nonsteroidal anti-inflammatory agents for pain in his knee. He observed copious bright red blood per rectum. On physical examination, he is tachycardic, and his peripheral pulses are faint but present. His mental status appears normal. His extremities are cool to touch. An intravenous line is placed. **Which of the following is the most appropriate next step in management?**

A. Begin parenteral administration of large volumes of colloid solution
B. Begin parenteral administration of large volumes of normal saline solution
C. Order an urgent hematocrit level
D. Order an urgent type and cross match for blood
E. Place two additional large bore peripheral intravenous catheters

The correct answer is B. The management of acute hemorrhage is the same for almost all patients, regardless of the etiology. In this case, a patient who is actively bleeding with apparent marginal vital signs requires immediate restoration of blood pressure via fluid resuscitation with at least 3 L of crystalloid solution (normal saline or lactated Ringer's) for every liter of blood lost. Tachycardia and hypotension are signs of a moderate to severe loss of blood volume, and no delay in initiating fluid therapy is warranted. Ordering an urgent type and cross match for blood (**choice D**), although appropriate for the overall short-term management of this patient, is not an acceptable therapeutic option in the face of active bleeding with no fluid resuscitation in progress. Ordering an urgent hematocrit level (**choice C**) is not useful in this case because hematocrit levels do not change for at least 4 hours after an acute bleed. In addition, it offers no therapeutic benefit and will not change the short-term management of this patient. Beginning parenteral administration of large volumes of colloid solution (**choice A**) is not indicated in this case. In fact, colloid is rarely indicated for fluid resuscitation since it may actually precipitate pulmonary edema, the only clear indication for colloid is in the therapy of early burns, as these patients have capillary leaks and are losing protein and albumin.

Placing two additional large bore peripheral IV catheters (**choice E**) is indicated only AFTER fluid resuscitation has been started through whatever peripheral or central access is available. The concept here is that large bore IV catheters or central catheters are required for aggressive fluid resuscitation, but not at the expense of delaying therapy through an already available, but smaller route.

17. A 28-year-old man comes to ER complaining of a 3 days abdominal pain. He developed acute pain in his right upper quadrant. The pain was none radiating and was associated with nausea and two episodes of non bloody emesis. 2 days ago, he began to turn "yellow." He has no significant past medical history, has had no recent illnesses, and denies any alcohol or drug abuse. On examination, he is afebrile and has Scleral icterus with mild jaundice of his skin. His right upper quadrant is tender, with no palpable gallbladder and no Murphy's sign. **Which of the following is the most appropriate next step in diagnosis?**

- A. Serum hepatitis A IgG titer
- B. Serum hepatitis A IgM titer
- C. Serum hepatitis B surface antibody titer
- D. Serum hepatitis C antibody
- E. Serum hepatitis D antibody.

The correct answer is B. This patient likely has acute hepatitis A infection. The prodroma of this infection is very similar to this patient's presentation, and within 10-14 days after infection, many patients will manifest varying degrees of abdominal pain as well as jaundice. The disease is self-limiting. In the acute setting, serum IgM antibody may be positive.

A positive serum hepatitis A IgG titer (**choice A**) would be seen months after the acute infection has passed and is a marker for previous infection.

A positive serum hepatitis B surface antibody titer (**choice C**) is a marker for previous hepatitis B exposure. A positive serum hepatitis C antibody (**choice D**) is a marker for hepatitis C infection.

18. A 17-year-old boy is presents with bloody diarrhea. Over the past 2 weeks, the boy has reported frequent urges to defecate that are accompanied by abdominal cramping. Over the past several days, the stools have become looser, and mucus was present around the feces. One hour ago, he saw fresh blood on his stool. On questioning, the boy notes that similar symptoms have occurred over the past 2 years, except for the blood in his stool. His temperature is 37.5°C, blood pressure is 120/70 mm Hg, pulse is 65/bpm, and respirations are 16/min. His abdomen is soft, without guarding, and there is localized tenderness in the right lower quadrant. **Which of the following is the most likely diagnosis?**

- A. Appendicitis
- B. Colon cancer
- C. Diverticulitis
- D. Pseudomembranous colitis
- E. Ulcerative colitis

The correct answer is E. Ulcerative colitis has a bimodal distribution of age of onset, with a large peak between ages 15 and 30 and a smaller peak between ages 50 and 70. It occurs in both sexes and all races. The underlying etiology of the condition is still poorly defined. The presentation illustrated is typical, and many patients have actually had developing disease for several years before the diagnosis is made. The process usually starts in the rectum, and the stool may be hard unless the involved segment of bowel is extensive. Stool mixed with mucus and fresh blood is typical of an

exacerbation. With severe disease, accompanying findings can include malaise, fever, anemia, anorexia, weight loss, and leukocytosis. The diagnosis should be confirmed by sigmoidoscopy.

19. A 60-year-old woman presents with of chronic fatigue and mild pruritus. She has a history of rheumatoid arthritis and autoimmune thyroiditis. On examination, her liver is modestly enlarged, firm, and nontender; skin xanthomas are noted. Routine serum chemistry studies show: Albumin 4.1 g/dL, Bilirubin, total 1.3 mg/dL. Creatinine 0.8 mg/dL, AST 55U/L, ALT 48 U/L, Alkaline phosphatase 240 U/L, serum gamma-glutamyl transpeptidase level of 150 U/L, and total cholesterol of 240 mg/dL. Immunoglobulin studies reveal a marked elevation of serum IgM. Ultrasound demonstrates diffuse enlargement of the liver without marked echogenicity. Endoscopic retrograde cholangiography demonstrates an intact extrahepatic biliary tree accompanied by stricture and loss of ducts within the liver itself. Liver biopsy shows a florid bile duct lesion with patchy inflammation and destruction of septal and interlobular bile ducts. **Antibodies directed against which of the following antigens are present in up to 95% of patients with this disease?**

- A. Double-stranded DNA
- B. Hepatitis A virus
- C. Hepatitis B core antigen
- D. Hepatitis C virus
- E. Mitochondria

The correct answer is E. The disease is primary biliary cirrhosis. This autoimmune disease is characterized by progressive destruction of intrahepatic bile ducts. In early stages of the disease, intense inflammation of the bile ducts can be seen on biopsy, often accompanied by bile duct proliferation as the liver attempts to compensate. Later stages are characterized by initial portal fibrosis that eventually evolves to frank cirrhosis. Patients tend to be women, aged 35-70 years, who typically present with insidious disease and often have a history of other autoimmune disease. Chronic fatigue and pruritus are common initial complaints. Hepatomegaly, or hepatosplenomegaly, may be present, as may skin xanthomas or hyperpigmentation. In laboratory studies, elevations of alkaline phosphatase and gamma-glutamyl transpeptidase are usually out of proportion to those of serum bilirubin and aminotransferases. Endoscopic retrograde cholangiography can be helpful in distinguishing the condition from the related primary sclerosing cholangitis, which damages both the extrahepatic and the intrahepatic biliary system. Biopsies early in the disease may demonstrate florid bile duct destruction; later biopsies are more likely to show nonspecific hepatic fibrosis or cirrhosis. A very helpful test is to measure autoantibodies directed against mitochondrial antigens, since this test is positive in up to 95% of patients with primary biliary cirrhosis; a few patients with "autoimmune" chronic active hepatitis may also have these antibodies.

20. A 55-year-old white man presents to ER with severe abdominal pain that has been radiating through to his back for the past 2 days. The man appears acutely ill and is sitting in a markedly bent-over position, holding his arms over his abdomen. He has also been throwing up, even when there is nothing in his stomach. His temperature is 38.1°C, blood pressure is 85/60 mm Hg, pulse is 120/min and regular, and respirations are 22/min and shallow. His lungs are clear to auscultation. Pressure on the upper portion of the abdomen intensifies the pain. The liver edge can be felt and has a nodular character. A complete blood count shows an erythrocyte count of 3.5 million/mm³, white blood cell count of 18,000/mm³ with predominately neutrophils and increased band forms, and a platelet count of 200,000/mm³. Which of the following is the most appropriate next step in diagnosis?

- A. Blood urea nitrogen
- B. Chest x-ray
- C. Esophagogastroduodenoscopy
- D. Serum amylase level
- E. Serum transaminase levels

The correct answer is D. This case illustrates a fairly classic presentation of acute pancreatitis. These patients often have a history of either alcohol abuse or gallstone disease. The pain described in the question stem is typical of acute pancreatitis, but some patients with more chronic disease may have surprisingly little pain. Very early in the disease, the patient's temperature may be subnormal, but fever usually develops within a few hours of onset. An elevated white count is usually present. The most helpful laboratory tests are serum amylase and serum lipase, elevation of which is considered strongly supportive of a diagnosis of pancreatitis.

21. A 25-year-old man is admitted to a burn unit after an automobile accident in which he lost consciousness and then was burned over 65% of his body. Two days after his accident, the nurse notices that small amounts of blood are returned through his nasogastric tube when she checks it prior to administering fluids. Endoscopy shows multiple, tiny to small (2-20 mm in diameter) ulcers in the corpus of the stomach. Which of the following is the most likely diagnosis?

- A. Acute erosive gastritis
- B. Chronic erosive gastritis
- C. Gastric atrophy
- D. Nonerosive gastritis
- E. Superficial gastritis

The correct answer is A. This is acute erosive gastritis, or "stress" gastritis, which is important to diagnose early because it can cause fatal gastrointestinal bleeding. Patients who develop this condition are usually already severely ill and very vulnerable to the problems of acute hemorrhage. Risk factors include severe burns, CNS trauma, sepsis, shock, and other organ system failure (respiratory, liver, renal, or multi-organ). Less severely ill patients may develop acute erosive gastritis as a complication of drug therapy particularly nonsteroidal anti-inflammatory drugs (NSAID s) or alcohol use. Because of the potential seriousness of the condition, most intensive care units use measures such as early enteral feeding, IV H₂ blockers, or PPI to prevent it.

22. A 65-year-old man reports feeling increasingly tired and short of breath. He had been well until a year ago, when he started losing weight despite any dietary change. He also complains of pencil thin stools. His wife has commented that he seems very pale. He is on no medications. Physical examination shows a pale-appearing man with an elevated heart rate. Rectal examination is positive for occult blood. Laboratory studies are remarkable for a hematocrit of 25%. Which of the following is the most appropriate next step in diagnosis?

- A. Colonoscopy
- B. Esophago duodenoscopy
- C. KUB (x-ray film showing the kidney, ureters and bladder)
- D. Open laparotomy
- E. Sigmoidoscopy

The correct answer is A. This patient may have colon cancer. The weight loss, pallor, and anemia are indicative of a chronic bleed, supported by the stool positivity for occult blood. Risk factors for colon cancer include a positive history of colon cancer or adenomatous polyps in a first-degree relative and a personal history of adenomatous polyps. Since our suspicion of colorectal cancer is high, it would be helpful to detect the lesion and remove it if possible. Colonoscopy provides the most efficient modality with which to achieve this goal.

23. A 40-year-old woman complains of fever and chills, jaundice, and right upper abdominal pain radiating to the shoulder for 24 hours. At present, the patient's temperature is 39°C, blood pressure is 100/60 mm Hg, pulse is 110/min, and respirations are 20/min. She is admitted for further diagnostic evaluation. Serum chemistry studies show: ALT 100 U/L, AST 80 U/L, Alkaline phosphatase 800 U/L, Total Bilirubin 4.5 mg/dL, Direct 3.5 mg/dL, Prothrombin time 12 sec and Amylase 200 U/L. White blood cell count is 12,000/mm³, with 70% neutrophils. Which of the following is the most likely diagnosis?

- A. Acute cholecystitis
- B. Acute hepatitis
- C. Acute pancreatitis
- D. Choledocholithiasis
- E. Cystic duct syndrome

The correct answer is D. The complex of fever, right upper abdominal pain, and jaundice is referred to as Charcot triad, which is diagnostic of acute cholangitis. This usually results from a small gallstone impacted within the common bile duct. Blockage of the common bile duct results in cholestatic jaundice: hence, elevated bilirubin (mostly direct) and high serum alkaline phosphatase. Gram-negative enteric bacteria then penetrate into the biliary ducts and cause ascending cholangitis, with resultant fever and neutrophilic leukocytosis. The pain is due to acute distention of the gallbladder.

24. A 30-year-old, dark-skinned man consults a physician because "his eyes turned yellow". Physical examination is remarkable for jaundice that is most visible in the sclera, palms, and nail beds. Serum chemistry studies show: Total bilirubin 6.8 mg%, direct bilirubin 0.8. Albumin 4.1 g/dL, Amylase 105 U/L, AST 20 U/L, ALT 25 U/L and Alkaline phosphatase 77 U/L. Which of the following is the most likely diagnosis?

A. Carcinoma of the ampulla of Vater
 B. Cholesterol gallstone disease
 C. Dubin-Johnson syndrome
 D. Hepatic cirrhosis
 E. Sickle cell disease

The correct answer is E. The patient has indirect (unconjugated) hyperbilirubinemia. In adults, the causes include intravascular hemolysis (due to acquired and genetic causes of hemolytic anemia, such as sickle cell anemia, hereditary spherocytosis, glucose-6-phosphate dehydrogenase deficiency, and autoimmune hemolysis) and genetic deficiencies of liver glucuronyl transferase activity (Gilbert syndrome and Crigler-Najjar syndrome). In contrast, direct (conjugated) hyperbilirubinemia can be due to intrahepatic causes (notably hepatitis, drug toxicity, and alcoholic liver disease) or extrahepatic causes (notably common bile stone and pancreatic cancer). Carcinoma of the ampulla of Vater (**choice A**) can cause direct hyperbilirubinemia. Gallstone diseases (**choice B**) involving the common bile duct can cause direct hyperbilirubinemia. Hemolytic anemias predispose for bile gallstones, rather than cholesterol stones.

Dubin-Johnson syndrome (**choice C**) is a hereditary disease with direct hyperbilirubinemia. Hepatic cirrhosis (**choice D**) can cause direct hyperbilirubinemia.

25. A 60-year-old woman complains of jaundice, pruritus, and anorexia for 2 weeks. She has one or two alcoholic drinks on social occasions and has smoked one pack of cigarettes daily for 30 years. She is currently taking a Thiazide diuretic for mild hypertension. Her temperature is 36.8°C, blood pressure is 130/80 mm Hg, pulse is 80/min, and respirations are 14/min. Physical examination confirms icteric discoloration of skin and mucosae. Abdominal examination is remarkable for slight tenderness in the right upper quadrant, and the liver is palpable 1 cm below the right costal arch. The spleen is not palpable. Serum chemistry tests show: AST 60 U/L, ALT 40 U/L, Alkaline phosphatase 1000 U/L, Total bilirubin 5.5 mg/dL, and Direct bilirubin 4.0 mg/dL. Which of the following is the most appropriate next step in diagnosis?

A. Abdominal CT or MRI scan
 B. Abdominal ultrasound
 C. Endoscopic retrograde cholangiopancreatography
 D. Percutaneous liver biopsy
 E. Percutaneous transhepatic cholangiography

The correct answer is B. The most crucial step in beginning investigations on a jaundiced patient is to determine whether the jaundice is due to hemolytic disease, hepatocellular damage, or biliary obstruction. Obstructive jaundice is characterized by a high proportion of direct (conjugated) bilirubin, elevated serum alkaline phosphatase

levels, and normal or mildly elevated aminotransferases. This case is therefore due to biliary obstruction. How to proceed? The most appropriate investigation is ultrasound examination to evaluate the hepatobiliary system and pancreas, determine whether extrahepatic bile ducts are dilated, establish the presence of gallstones, and identify hepatic or pancreatic masses.

26. A 45-year-old woman presents to ER complaining of acute abdominal pain. She has a history of a peptic ulcer for several years that has been treated with an H₂ blocker. She denies diarrhea, nausea, or vomiting, and states that she does not use alcohol or nonsteroidal anti-inflammatory medications. The pain is constant and none radiating. On examination, she is tachycardic, but does not have a fever. Abdominal examination is remarkable for rigidity and rebound tenderness. Rectal examination produces dark stool that is guaiac positive. Which of the following is the most appropriate next step in management?

A. Abdominal CT scan
 B. Erect abdominal x-ray film
 C. Exploratory laparotomy
 D. Laparoscopic exploration
 E. Upper endoscopy

The correct answer is B. This patient most probably is suffering from a perforated ulcer and has free air in the peritoneum. Such patients often present with a rigid abdomen and rebound tenderness. The best way to detect this is to look for free air under the diaphragm, which is best achieved with an upright chest x-ray. Exploratory laparotomy (**choice C**) may be needed to correct the perforation, but the upright x-ray film should be obtained first to confirm the diagnosis.

27. A 45-year-old woman comes to ER because of the sudden onset of abdominal pain that radiates from the right hypochondrium to the shoulder. The pain is steady, with periodic exacerbations. The patient is afebrile. Ultrasound examination reveals a stone in the cystic duct. Which of the following is the most appropriate next step in management?

A. Endoscopic sphincterotomy with stone extraction
 B. Laparoscopic cholecystectomy
 C. Lithotripsy with bile salt treatment
 D. Open cholecystectomy
 E. Ursodeoxycholic acid treatment

The correct answer is B. This patient manifests the classic symptomatology of biliary colic, characterized by pain in the right hypochondrium, which often radiates to the right shoulder. Patients are most often anicteric and afebrile. Virtually all of these cases are due to a gallstone obstructing the cystic duct. If the stone is in the common bile duct, obstructive jaundice becomes a prominent sign. Laparoscopic cholecystectomy is the intervention of choice since the patients can be discharged within 48 hours after surgery, and the procedure is associated with minimal trauma to the abdominal wall.

Gastroenterology & Hepatology (MCQs)

28. A 55-year-old man presents with fatigue and weakness. On physical examination, the man is pale, but no other abnormalities are noted. A complete blood count demonstrates a severe microcytic anemia. Stool is positive for occult blood. Upper endoscopy is negative. Colonoscopy demonstrates a large fungating mass of the Caecum. CT scans of the chest and abdomen do not reveal metastatic disease. **Which of the following substances would provide a baseline to assess the possibility of recurrent cancer later in life?**

- A. Alpha fetoprotein (AFP)
- B. Carcinoembryonic antigen (CEA)
- C. Human chorionic gonadotropin (hCG)
- D. Prostate-specific antigen (PSA)
- E. Thyroid-stimulating hormone (TSH)

The correct answer is B. The patient has colon cancer. It is important before many cancer surgeries to measure serum levels of appropriate tumor markers, since elevation of these markers before surgery indicates that they can then be used for monitoring disease recurrence. In the case of colon cancer, appropriate markers include CEA, CA 19-9, and CA 125. CEA is actually a nonspecific marker for many solid tumors, but is particularly useful in colon cancer, where it is commonly elevated. AFP (**choice A**) is a marker for liver, ovary and testicular cancer. HCG (**choice C**) is produced by many tumors but is not as good as CEA for colon cancer. PSA (**choice D**) is a marker for prostate cancer, although it is increased in benign prostatic hyperplasia as well. TSH (**choice E**) is produced by some choriocarcinomas

29. A 50-year-old man presents with arthralgias, hepatomegaly, and increased skin pigmentation for 3 months. Examination reveals a bronze color of the skin. The liver is palpable 3 cm below the right costal arch, but there is no splenomegaly. Moderately advanced testicular atrophy is appreciated. An S₃ sound is heard on cardiac auscultation. Laboratory studies show: AST 80 U/L, ALT 70 U/L, Alkaline phosphatase 120 U/L, Bilirubin, total 1.5 mg/dL, Ferritin 400 ng/dL (N: 15-200), Transferrin saturation 60% (N: 15-50%), Glucose, fasting 180 mg/dL. Serologic tests for hepatitis virus antibodies are negative. **Which of the following investigations would be the most appropriate next step in diagnosis?**

- A. CT or MRI studies of the liver
- B. Determination of hepatic iron content in a liver biopsy
- C. Measurement of serum alpha 1 -antitrypsin
- D. Measurement of urinary copper excretion
- E. Serum titers of antinuclear and antimitochondrial antibodies

The correct answer is B. Hepatomegaly, arthralgias, and skin hyperpigmentation (which may give the characteristic "bronze" color) are among the most common initial signs of hemochromatosis. Testicular atrophy is often present as well. Hemochromatosis leads to iron overload affecting the whole organism, but the liver, heart, pancreas, and endocrine glands bear the most severe injurious effects of iron deposition. Thus, cardiomyopathy and diabetes frequently manifest because of myocardial and pancreatic damage. A gallop rhythm, with associated S₃ sound, is evidence of cardiomegaly. Note the high ferritin levels and elevated transferrin

Gastroenterology & Hepatology (MCQs)

saturation, indicating systemic iron overload. This disease is an autosomal recessive disease. When hemochromatosis is suspected, the definitive diagnostic confirmation relies on determination of iron content in liver biopsies. Histologic evaluation of iron deposition is not sufficiently accurate.

30. An elderly woman complains of chronic constipation. Her physician performs a full physical examination, including a rectal examination to exclude masses. A complete blood count, thyroid-stimulating hormone, fasting glucose, and electrolyte studies are also ordered. Neither the physical examination nor the laboratory tests reveal any abnormalities that might suggest serious disease. **Which of the following is the most appropriate next step in management?**

- A. Docusate
- B. Lactulose
- C. Magnesium phosphate
- D. Mineral oil
- E. Psyllium

The correct answer is E. Chronic constipation is a common problem in the elderly; however, before reassuring the patient, the physician has an obligation to exclude serious disease such as colon cancer. Once the physician is reasonably convinced that there is no serious underlying pathology, the next steps are to suggest increasing fiber in the diet and to discontinue any medications that may be causing the constipation. If these steps fail, then the addition of bulking agents (bran, psyllium, calcium polycarbophil, or methylcellulose) is warranted. Long-term use of other types of laxatives is not recommended.

Docusate (**choice A**) is a wetting agent (detergent laxative) that softens stools by increasing their water content. Lactulose (**choice B**) and magnesium phosphate (**choice C**) are osmotic agents sometimes used to prepare patients for diagnostic bowel procedures. Mineral oil (**choice D**) softens fecal matter but is not recommended for long-term use because it may decrease absorption of fat soluble vitamins.

31. A 55-year-old man is brought to ER by the police after being found wandering and incoherent to himself. The man is unable to give a coherent history. The initial impression is of an emaciated, jaundiced, and confused man who appears older than his stated age. Vital signs are stable and within normal limits. The breath has a musty, sweet odor. Abdominal examination shows ascites and marked nodularity of the liver edge. A "caput medusa" is seen near the umbilicus. Neurologic examination is notable for asterixis. A toxicology screen is negative. Aspartate aminotransferase (AST), alanine aminotransferase (ALT), and blood ammonia are all moderately increased. The man is admitted to the hospital and given an extremely low protein diet with oral carbohydrate supplementation. The bowels are cleared with an enema. **Which of the following is the most appropriate pharmacotherapy?**

- A. Ampicillin, oral
- B. Benzathine penicillin, intramuscular
- C. Ceftriaxone, oral
- D. Neomycin, oral
- E. Penicillin G IV

The correct answer is D. This patient has hepatic encephalopathy (hepatic coma, portal-systemic encephalopathy), which is a neuropsychiatric syndrome caused by liver disease. It is usually associated with portal-systemic shunting of venous blood, which can cause esophageal varices and dilation of veins near the umbilicus ("caput medusa"). The diagnosis is usually made on clinical, rather than laboratory, grounds, since liver function tests correlate poorly. Serum ammonia level is usually elevated, but specific values correlate poorly with clinical status. Therapy is based on removing sources of nitrogen (e.g., protein) in the gut by enema, restriction of dietary protein, and reduction of bacterial load (since some bacteria produce ammonia). Two different strategies are commonly used for reducing the bacterial load: oral lactulose, which acts as an osmotic cathartic to "wash the bacteria out," and oral neomycin (a poorly absorbed aminoglycoside), which can be used to kill most of the bacteria while minimizing significant systemic side effects. (Oral neomycin is also sometimes used as part of bowel preparation prior to abdominal surgery.) Other types and routes of administration of antibiotics are not usually used in this setting. In some hospitals, oral neomycin is initially used for bacterial load reduction. Patients are then switched to longer-term lactulose, thereby limiting the potential nephrotoxicity and ototoxicity of the neomycin.

32. A 72-year-old woman complains of persistent left lower abdominal pain and frequency of urination for 2 days. In the past year, she had similar episodes accompanied by mild fever, which resolved spontaneously. Her temperature is 38.5°C. Tenderness is noted on palpation of the left lower quadrant of the abdomen. Bowel sounds are absent. Complete blood count shows: 12,000 leukocytes/mm³, with 85% neutrophils. Microscopic urinalysis shows 5 leukocytes/high power field. A test of stool is positive for occult blood. **Which of the following is the most appropriate next step in diagnosis?**

- A. Barium enema
- B. Colonoscopy
- C. CT scan of the abdomen
- D. Intravenous pyelography
- E. Plain abdominal x-ray

The correct answer is E. Diverticular disease with diverticulitis should be suspected in this case. This condition is extremely frequent in industrialized countries, but more than two thirds of cases remain asymptomatic. The sigmoid colon is the most commonly affected segment. Complications of diverticulosis may include one or more of the following clinical syndromes: occult or obvious bleeding, acute hematochezia, or diverticulitis. Abdominal pain, fever, and neutrophilic leukocytosis suggest diverticulitis in the appropriate clinical setting. How should the physician proceed from this point? There is no evidence for perforation in this patient. Plain abdominal x-rays in the flat and erect positions are necessary to identify radiologic signs of perforation (free air in the abdomen) or bowel obstruction. CT scan of the abdomen (**choice C**) is useful to define the extent of extracolonic spread of diverticular inflammation, presence of paracolic abscesses, and coexistence of other anomalies (tumors).

Colonoscopy (**choice B**) is less sensitive than barium enema in visualizing diverticula and is not indicated during the acute phase of diverticulitis. Frequent urination and mild leukocyturia result from inflammation of the left ureter due to the adjacent

inflamed colonic diverticula. Urinary symptoms and leukocyturia and/or microscopic hematuria are sometimes associated with diverticulitis and should not suggest the need for intravenous pyelography (**choice D**).

33. A 23-year-old woman has just informed that her husband has chronic hepatitis B infection. She is not clinically ill, but she is very worried that she may have been exposed to the virus. **Which of the following offers the first evidence of acute infection?**

- A. Anti-HBc
- B. Anti-HBs
- C. HBcAg
- D. HBeAg
- E. HBsAg

The correct answer is E. HBsAg is associated with the viral surface coat and is usually the first evidence that an acute hepatitis B infection is under way. It characteristically appears during the incubation period, typically during a period of 1-6 weeks before either liver enzymes rise or the patient develops jaundice. It usually disappears during convalescence; demonstrable persistence after that time indicates chronic infection.

Anti-HBc (**choice A**) is the antibody to the core antigen and generally appears at the onset of clinical illness and then declines slowly. Roughly 80 to 90% of patients will develop antibodies to the surface antigen, anti-HBs (**choice B**), usually weeks to months after HBsAg appears. Patients who do not develop the antibody are likely to have chronic infection.

HBcAg (**choice C**) is the core antigen and is usually not detectable in serum, except by special techniques that disrupt the infectious particles.

HBeAg (**choice D**) is the e antigen. It appears to be a peptide from the viral core, whose presence suggests active viral replication, with greater likelihood of progression to chronic liver disease, and with greater infectivity risk.

34. A surgeon performing a needle liver biopsy sustains an accidental needle stick during the procedure. Three months later, the physician has newly developed anti HCV antibodies. **What is the chance of developing chronic infection, once infection is documented?**

- A. 10%
- B. 20%
- C. 45%
- D. 75%
- E. 98%

The correct answer is D. Most initial infections with hepatitis C are subclinical. However, the infection has a 75% rate of chronicity (compared with 5 to 10% for hepatitis B), which can go on over a period of years to over a decade to develop cirrhosis. A rule of thumb worth knowing about needle-stick exposures to known infectious patients is that the AIDS virus has a 3 in 1000 rate of being transmitted by

this route; the hepatitis C virus has a 3 in 100 rate of being transmitted; and the hepatitis B virus has a 3 in 10 rate of being transmitted. However, we have available a vaccine against hepatitis B that virtually all medical workers have received, and no vaccine is yet available that is directed against the hepatitis C virus. Also, therapy for hepatitis C infection is very problematic. Interferon shows some activity against the virus; however, interferon therapy is extremely expensive and toxic and may need to be given for long periods or indefinitely. The addition of oral ribavirin significantly improves clinical response rates and is now the standard treatment for hepatitis C. Hemolytic anemia may occur during ribavirin therapy.

35. A 45-year-old man has several months of heartburn and indigestion. He denies dysphagia or weight loss. Furthermore, the patient denies chronic diarrhea, fever, chills, or shakes. The patient has no other medical issues. He has been placed on anti reflux medications including omeprazole, 20 mg daily. This regimen has not cured the patient's symptoms, however. As a result, the patient undergoes an upper endoscopy. Endoscopy reveals nonspecific gastritis. Random biopsies done during the procedure reveal mucosa-associated lymphoid tissue (MALT) lymphoma. Which of the following is the appropriate management?

- A. Chemotherapy
- B. Eradication of *Helicobacter pylori*
- C. Observation
- D. Radiation therapy
- E. Radiation therapy and chemotherapy

The correct answer is B. Most mucosa-associated lymphoid tissue lymphoma is related to *Helicobacter pylori* infection. Studies have shown that eradication of infection of *H. pylori* results in regression of such infection. This treatment involves a prolonged course of antibiotic therapy aimed at eliminating the bacteria.

36. A 50-year-old diabetic man presents with epigastric pain. Which of the following suggests a diagnosis of peptic ulceration rather than chronic pancreatitis?

- A. Back pain
- B. Exacerbation with alcohol
- C. Loose stool
- D. Relieved by food
- E. Weight loss

The correct answer is D. Relief with food suggests peptic (and specifically) duodenal ulceration, it is likely that food would precipitate the pain of chronic pancreatitis. Loose stool is suggestive of pancreatitis/malabsorption. Pain referred to the back occurs in both situations and hence not suggestive. Weight loss can occur in both gastric ulcers and pancreatitis and not very suggestive. Alcohol may well exacerbate both types of pain.

37. An asymptomatic 40-year-old female underwent an abdominal ultrasound scan as part of a clinical trial and was noted to have gallstones but entirely normal liver function tests. Which one of the following is the most appropriate management?

- A. Chenodeoxycholic acid
- B. Laparoscopic cholecystectomy
- C. Lithotripsy
- D. Observation
- E. Ursodeoxycholic acid

The correct answer is D. This patient is asymptomatic and does not require any treatment at present. There is no proven role for the use of oral drugs to try and reduce the formation of gallstones. The only definitive treatment would be a cholecystectomy but that is not generally offered for asymptomatic gallstones.

38. A 63-year-old patient with known chronic hepatitis C complicated by cirrhosis presented with ascites, abdominal tenderness and peripheral edema. A diagnostic tap revealed a neutrophil count of $400/\text{mm}^3$ ($<250/\text{mm}^3$). Which of the following would be of most immediate benefit?

- A. Fluid restriction and a no added salt diet
- B. Intravenous antibiotics
- C. Oral spironolactone
- D. Therapeutic paracentesis
- E. Trans-jugular intrahepatic Porto-systemic shunt

The correct answer is B. This man has spontaneous bacterial peritonitis (SBP). Appropriate treatment is IV - antibiotics. He is likely to have a decreased intravascular volume and require IV albumin as volume expansion. Fluid restriction, diuretics, or large volume paracentesis are likely to cause further hypovolemia and precipitate renal failure. There is no stated indication for a TIPS, indications are: diuretic resistant ascites, intractable portal hypertensive bleeding and Hepato-renal failure.

39. A 69-year-old male is seen in Outpatient clinic. He reports weight loss over 3 months but his history is otherwise unremarkable. On examination his abdomen is soft with no-palpable masses. A PR examination is normal. His blood tests show: Hemoglobin 8.0 g/dL, MCV 70 fL (80-96). Which of the following is the most appropriate investigation for this patient?

- A. Abdominal X-ray
- B. CT scan of the abdomen
- C. Sigmoidoscopy
- D. Ultrasound scan of abdomen
- E. Upper GI endoscopy and colonoscopy

The correct answer is E. This man has weight loss and an unexplained microcytic anaemia. The likely site of blood loss is from the GI tract in absence of an alternative explanation. This may be due to an occult GI malignancy and, therefore, the initial investigations of choice are upper and lower GI endoscopy.

40. An 80-year-old female presents with confusion associated with a chest infection. She received standard treatment, and four days later she developed green, then bloody diarrhoea. Which of the following organisms is most likely to be responsible for her diarrhoea?

A. *Campylobacter jejuni*
 B. *Clostridium difficile*
 C. *Escherichia coli*
 D. Methicillin-resistant *Staphylococcus aureus*
 E. Vancomycin-resistant enterococcus

The correct answer is B. This is typical of *Clostridium* infection with pseudomembranous colitis induced by prior treatment with broad spectrum antibiotics such as cefuroxime, amoxicillin-clavulanic acid and the macrolides. It is treated with oral vancomycin, metronidazole.

41. A 25-year-old man is admitted with nausea and frequent vomiting four hours after a meal in a restaurant. Lastly he vomits a cup full of blood. What is the cause of his haematemesis?

A. Duodenal ulceration
 B. Esophageal varices
 C. Esophagitis
 D. Hemorrhagic Gastritis
 E. Mallory-Weiss tear

The correct answer is E. Persistent vomiting can eventually lead to small tears in the esophagus leading to the vomiting of red blood. Varices would produce large volumes of blood.

42. A 58-year-old man presents with dysphagia for solids for the past three months. He also complains of weight loss and loss of appetite. There is no other past medical history, apart from symptoms of heartburn for the past five years. He is a heavy smoker. He undergoes endoscopy and the report mentions a small tumour at the lower end of the esophagus. What is the most likely aetiological cause for the tumour?

A. Alcohol
 B. Barrett's esophagus
 C. Esophageal candidiasis
 D. Esophageal pouch
 E. *Helicobacter pylori*

The correct answer is B. The history suggests a 5 year history of gastro esophageal reflux. This can cause columnization of the esophageal mucosa known as Barrett's esophagus, which is a premalignant state. Surveillance endoscopies are recommended every three years. The development of dysphagia for solids and weight loss suggests the presence of esophageal carcinoma.

43. A 40 year old man with a history of left-sided Crohn's colitis. Though, previously treated with steroids and 5-ASA, he has had several relapses in the past year. The last relapse treated with high doses steroids and was complicated by gastric bleeding. Investigation show :

Hemoglobin	10.8 g/dL
MCV	76 fL
White cell count	400 000/ mm ³
Platelets	150,000
Serum total protein	7 g/dl
Serum albumin	3 g/dl
Serum CRP	30mg/L (<10)
Abd X-ray is normal	

Which of the following is the most appropriate management?

A. A trial of oral metronidazole three months.
 B. Total colectomy with ileostomy construction.
 C. Total colectomy with pouch construction.
 D. Treatment with azathioprine.
 E. Treatment with oral budesonide.

The correct answer is D. This patient has all the hallmarks of active Crohn's colitis that is failing to settle with first-line medical therapy. The next step is a trial of azathioprine, which is used as a steroid-sparing agent. This is particularly relevant to this particular patient, as he has had a serious side effect from previous steroid treatment. Metronidazole is rarely effective in the treatment of active Crohn's colitis. Given that an operation should not be embarked upon without first a trial of the Second-line medical therapies such as azathioprine, mycophenolate or infliximab.

44. A 48-year-old woman complains of pruritus, steatorrhea and bruising. On examination, she is jaundiced, pigmented with spider naevi and hepatosplenomegaly. What is the most likely underlying diagnosis?

A. Alcoholic liver disease
 B. Alpha-1 antitrypsin deficiency
 C. Autoimmune hepatitis
 D. Primary biliary cirrhosis
 E. Wilson's disease

The correct answer is D. She has clinical evidence of chronic liver disease and portal hypertension. The 2 main conditions causing pigmentation and chronic liver disease are primary biliary cirrhosis (PBC) and hemochromatosis. PBC is a chronic cholestatic inflammatory liver disease, the aetiology of which is probably autoimmune. It most commonly affects middle-aged women. There is jaundice with skin pigmentation, risk of developing esophageal varices and fat malabsorption, leading to deficiency of the vitamins A, D, E, K (hence osteomalacia and also bruising). Serum antimitochondrial antibody is positive in 95-99% cases.

45. A 58-year-old man complains of tiredness, fever, weight loss, arthralgia and diarrhoea. Jejunal biopsy reveals flattened mucosa containing periodic acid-Schiff (PAS) positive macrophages. What is the most likely diagnosis?

- A. Coeliac's disease
- B. Parasitic infection
- C. Tropical sprue
- D. Tuberculosis
- E. Whipple's disease

The correct answer is E. Whipple's disease is rare and affects most commonly middle-aged male. It can affect any organ, but dominated by involvement of small bowel, causing malabsorption. The organism (*Tropheryma whippelii*) can be identified both between and within abnormal macrophages, which stain magenta with PAS. Treat with prolonged antibiotics e.g. trimethoprim-sulphamethoxazole for 1 year.

46. A 35-year-old woman with liver cirrhosis is admitted with deteriorating encephalopathy and abdominal discomfort. An ascitic tap revealed a polymorphonuclear cell count of 350 cells per mm³. Which of the following most appropriate therapy?

- A. Intravenous amoxicillin
- B. Intravenous cefotaxime
- C. Intravenous metronidazole
- D. Oral neomycin
- E. Oral norfloxacin

The correct answer is B. This lady has Spontaneous Bacterial Peritonitis as suggested by the typical history, ascites and raised polymorphonuclear count within the ascitic tap. The causative organism is usually *Escherichia coli*, *Klebsiella*, *S. Pneumoniae* or *Enterococci*. (Compare this with the mixed growth seen in other forms of peritonitis). Treatment is with broad spectrum antibiotics such as cefotaxime. Norfloxacin is recommended for short term prophylaxis.

47. A 19-year-old student presents with a fifteen week history of diarrhoea. He has lost 2kg in weight. A smear of a duodenal biopsy reveals many trophozoites. What is the best treatment option?

- A. Ciprofloxacin
- B. Gluten free diet
- C. Metronidazole
- D. Prednisolone
- E. Quinine

The correct answer is D. The diagnosis here is Giardiasis, caused by *Giardia lamblia*. *Giardia* has been reported as a cause of chronic diarrhoea. Most patients respond to oral metronidazole 250-400 mg t.d.s. for 5 days.

48. 51-year-old man presents with hematemesis. Which of the following features would categorize him into a high risk group?

- A. A blood pressure of 135/85 mmHg
- B. A history of ischaemic heart disease.
- C. A plasma glucose of 130 mg/dl
- D. A pulse of 90 beats per minute
- E. His age

The correct answer is B. Clinical and Lab. parameters: A drop in systolic blood pressure, raised pulse rate, the presence of melena or syncope, and evidence of hepatic or cardiac disease

The higher the age the worse the prognosis, comorbidities (IHD), the presence of shock, elevated blood urea nitrogen, reduced hemoglobin.

Endoscopic abnormalities: active bleeding, major stigmata of recent hemorrhage, ulcers greater than 2 cm in diameter, and the location of ulcers in proximity to large arteries.

49. A 32 year-old woman with Crohn's disease has a history of a right hemicolectomy for ileocolonic disease. Since the operation she has had frequent diarrhoea but no blood in the stools. Investigations show:

ESR	10mm /1st hour
Platelets	240 000/mm ³
Serum CRP	7 mg/L (<10)

Which is the best treatment?

- A. Cholestyramine
- B. Mesalazine
- C. Metronidazole
- D. Omeprazole
- E. Prednisolone

The correct answer is A. The ESR, CRP and platelet counts are not raised, indicating that this patient's symptoms are not due to active Crohn's. Also the diarrhoea is not bloody which goes against active Crohn's colitis. Hence mesalazine or prednisolone would not be effective here. Metronidazole is typically given for peri-anal disease. The history includes a previous right hemicolectomy for ileo-colonic disease. Loss of the terminal ileum frequently leads to bile salt malabsorption and treatment with the bile salt chelating cholestyramine quickly relieves the problem.

Gastroenterology & Hepatology (MCQs)

50. A 29-year-old man presents with anaemia, bleeding tendency, diarrhea and abdominal pain. Examination reveals a palpable mass in the right lower quadrant and anal skin tags. What is the most likely underlying condition?

- A. Celiac disease
- B. Chronic pancreatitis
- C. Crohn's disease
- D. Intestinal lymphoma
- E. Ulcerative colitis

The correct answer is C. Crohn's disease commonly presents with diarrhea, abdominal pain and weight loss. It can affect the whole gastrointestinal tract, the commonest being ileocolitis. Anaemia is usually due to blood loss and less commonly B12/folate malabsorption. An abdominal mass is often palpable in presence of small bowel disease, which can lead to Vitamin K malabsorption. Anal tags, fissures, perianal fistulae and abscesses are associated with Crohn's disease and not ulcerative colitis.

51. A 33-year-old man with chronic hepatitis C is admitted with general deterioration. He has missed many of these previous outpatient appointments and currently is not receiving any treatment. On examination he is generally unwell with a temperature of 37.8°C, blood pressure 110/75 mm Hg, and appeared jaundiced. His investigations revealed:

Serum Sodium	133 mEq/L
Serum potassium	4.3 mEq/L
Serum Urea	120 mg/dl
Serum Creatinine	2.7mg/dl
Bilirubin	2.5mg/dl
AST	92 U/L
Alk Phosphatase	267 U/L
Albumin	30 g/L
Urine sodium	15 mmol/L

What is the likely diagnosis?

- A. Abdominal tuberculosis
- B. Hepatocellular carcinoma
- C. Hepatorenal syndrome
- D. Mixed essential cryoglobulinemia.
- E. Spontaneous bacterial peritonitis.

The correct answer is C. The abnormal urea and creatinine plus the low urine sodium suggest a diagnosis of hepatorenal syndrome. Fluid balance is very difficult in these patients but some respond to treatment with IV Somatostatin analogue which improves kidney perfusion.

Gastroenterology & Hepatology (MCQs)

52. A 24-year-old man with chronic diarrhoea and malabsorption is suspected of having coeliac disease. A jejunal biopsy is taken. Which of the following findings would be expected?

- A. Shows epithelial cells distended with fat globules
- B. Shows fissures penetrating into the submucosa
- C. Shows flattening of the crypts
- D. Shows leaf-shaped villi
- E. Shows subtotal villous atrophy

The correct answer is E. In coeliac disease, the villi are shortened and the crypts lengthened with increased lymphocytic infiltrate. Tropical sprue may also cause subtotal villous atrophy. Fissures are not found and epithelial cells are normal.

53. A 28-year-old lady develops abdominal pain, jaundice and rapidly accumulating ascites worsening over a week. She takes oral contraceptive pill. Which of the following findings would be most likely present?

- A. Acute liver failure
- B. Alanine aminotransferase of 345 U/L
- C. Ankle edema
- D. Ascites fluid protein of 38 g/L
- E. Tender enlarged liver

The correct answer is E. The most common causes of an acute severe liver injury in a young woman are: viruses (including: HA V, HBV), drugs (particularly paracetamol), Autoimmune hepatitis, and hepatic vein thrombosis (often precipitated by pregnancy or OCP use). The presence of liver failure, ankle edema, and an exudative ascites do not help differentiate between these etiologies. The ALT of 345 is moderately elevated and compatible with BCS. With viral or drug related hepatitis the peak ALT is usually much higher than this, the ALT may already be on the way down if she has had symptoms for a week. Tender hepatomegaly is one of the hallmarks of BCS. In acute severe viral, autoimmune or drug / toxin related liver disease. The necrotic liver decreases in size.

54. A 52-year-old woman presented with history of worsening dysphagia over many years. Recently there had been episodes of ill-defined central chest discomfort and nocturnal cough. What is the most likely diagnosis?

- A. Achalasia
- B. Barrett's esophagus
- C. esophageal carcinoma
- D. motor neurone disease
- E. pharyngeal pouch

The correct answer is A. Achalasia presents most often in the 3rd - 5th decade. Symptoms usually develop years before the patient presents. Vague chest discomfort is common. 30% have a nocturnal cough due to aspiration of esophageal contents. Barrett's esophagus does not cause dysphagia. MND causes dysphagia due to problems with chewing and initiating a swallow and would not cause chest discomfort. Esophageal

carcinoma is very unlikely due to the duration of symptoms (years). A pharyngeal pouch usually presents in the 6th- 7th decade with regurgitation and would not cause chest discomfort.

55. A 52-year-old man presents with a one month history of intermittent, colicky, central abdominal pain and 3 kilogram weight loss and positive faecal occult blood. What is the most appropriate investigation?

A. Anti-endomysial antibody;
B. Colonoscopy.
C. CT scan of abdomen.
D. Distal duodenal biopsy.
E. Small bowel enema.

The correct answer is B. New-onset weight loss, with positive faecal occult blood and central abdominal pain in a 52-year-old man must be assumed to be colonic carcinoma until proven otherwise. Colonoscopy is the best way to check for this and would also demonstrate inflammatory bowel disease if present. If the colonoscopy was negative, then an upper endoscopy would be needed to check for upper GI malignancy.

56. A 30 year-old male presents with acute, profuse, watery diarrhoea with some blood after returning from a work trip in Tanzania. He had been taking oral rehydration salts. Which one of the following is the most appropriate treatment?

A. Ciprofloxacin
B. Loperamide
C. Metronidazole
D. Prednisolone
E. Vancomycin

The correct answer is A. The most likely cause of such traveler's diarrhoea is *E. coli* and hence ciprofloxacin is recommended for first line antibiotic therapy (when needed) before stool culture results are available. Metronidazole would be suitable for *Giardia* infection but its course is usually more insidious.

57. A 52 year-old male presents with general deterioration. He is a smoker of 5 cigarettes daily. Examination reveals that he is jaundiced, has numerous spider naevi on his chest and he has a temperature of 37.2°C. Abdominal examination reveals Hepato-splenomegaly. Investigations reveal:

Bilirubin	10 mg/dl
Alkaline phosphatase	550 IU/L
AST	258 IU/L
Albumin	40 g/L

Hepatitis B virus surface antigen positive

Hepatitis B virus e antigen negative

Hepatitis B virus DNA undetectable

What is the most likely diagnosis?

A. Autoimmune chronic active hepatitis
B. Biliary cirrhosis
C. Carcinoma of the pancreas
D. Chronic hepatitis B infection
E. Chronic hepatitis D (delta) infection

The correct answer is D. HBsAg is positive, Hepatitis e antigen is negative and the DNA being undetectable suggests that it is Chronic HBV infection with low viral replication.

58. A 56-year-old, man presents with abdominal pain and a mass in the right upper quadrant. He reported that he had been diagnosed with viral hepatitis several years previously. Investigations showed: Serum alpha fetoprotein 13,500 IU/L (<10). Which of the following is the most likely underlying viral infection?

A. Cytomegalovirus.
B. Hepatitis A virus
C. Hepatitis C virus
D. Hepatitis D virus
E. Hepatitis E virus.

The correct answer is C. The patient has chronic viral hepatitis and presents with a hepatoma. From the given choices only HCV cause hepatoma. HBV can also cause hepatoma.

59. A previously well 40-year-old man is admitted with a single attack of hematemesis after taking 300 mg of aspirin five hours previously. On examination, pulse was 120/min with a blood pressure of 110/75 mmHg (lying) and 90/60 mmHg (standing). Respiratory and abdominal examinations were otherwise normal. His hemoglobin concentration was 7 g/dL. What is the most likely cause?

A. Angiodysplasia
B. Duodenal ulcer
C. Esophagitis
D. Gastric cancer
E. Gastric erosions

The correct answer is E. The most likely, answer is gastric erosions based upon the fact that the incident has occurred after only one dose of Aspirin without any prior history of chronic usage which is associated with esophagitis and ulcer formation. Malignancy is unlikely because of history of being fit and also the age.

60. A 22-year-old man presented to casualty by fever, rigors and headache. On examination he was febrile (38°C) with a blood pressure of 115/65 mmHg, and a pulse of 100/minute. His abdomen was tender in the right upper quadrant. Investigations showed:

Hb	11.0 g/dL
WBC	15.5 x 1000/ mm ³
Neutrophils	13.5 x 1000/ mm ³
Platelets	350 x 1000/ mm ³
Blood film	No malaria parasites seen
Alk Phos	450 U/L (45-105)
AST	50 U/L
CRP	88 mg/L (<10)
Stool culture	Negative
Chest X ray	Small right pleural effusion noted

Which of the following investigations would be of most diagnostic value?

- A. Hepatitis E serology
- B. Sigmoidoscopy
- C. Stool microscopy for ova, cysts and parasites
- D. Typhoid serology
- E. Ultrasonography of the abdomen

The correct answer is E. The presentation is not consistent with Hepatitis E infection. Typhoid serology is unreliable. The differential diagnosis is mainly pyogenic or amoebic liver abscess. Pyogenic abscesses present with swinging pyrexia, neutrophilia and high inflammatory markers. Right-sided pleural effusion is common and blood cultures are often positive. The presentation of amoebic liver abscess (ALA) is very similar. Most patients do not have bowel symptoms at any time and amoebic cysts are found in stool in less than 50% of proven cases of ALA. Serology is the main stay of diagnosis. Ultrasound scan would confirm most moderate-sized to large liver abscesses; and could guide a diagnostic aspiration. Small lesions are best demonstrated by CT or MRI.

61. A 32-year-old female presents with pruritus and jaundice. She is 30 weeks gestation in her first pregnancy. There is no fever, abdominal pain or vomiting. The Liver Function Tests showed: ALT 72 U/L, Alkaline phosphatase 700 U/L, Bilirubin 5mg/dl, and Serum bile acids 100 times normal titre. What is the most likely diagnosis?

- A. Acute fatty liver
- B. Cholestasis of pregnancy
- C. HELLP syndrome
- D. Normal pregnancy
- E. Viral hepatitis

The correct answer is B. The diagnosis here is Intrahepatic Cholestasis of pregnancy which presents with markedly elevated serum bile acids. It presents in the 2nd or 3rd trimester, and usually the alkaline phosphatase is 7-10 times normal, with raised ALT, AST and bilirubin. Treatment options include ursodeoxycholic acid, cholestyramine, and vitamin K to treat the coagulopathy. ALP rises in pregnancy but not to this extent. The placenta is the source of the raised ALP. Viral hepatitis is the commonest cause of jaundice in pregnancy, but the elevated bile acids, absence of fever, abdominal pain or vomiting make this unlikely in this case.

62. A 29-year-old male presents with symptoms of severe heart burn, nocturnal cough and asthma not responding to PPI for the last 2 years. Which one of the following is most useful in assessing the role of surgery?

- A. cardiac sphincter manometry
- B. esophageal motility study
- C. esophageal pH monitoring on therapy
- D. gastric emptying study
- E. intragastric pH monitoring of therapy

The correct answer is B. Laparoscopic fundoplication is the treatment of choice for patients with GERD refractory to or intolerant of, Proton Pump Inhibitor therapy. The patient should have had an endoscopy at least 6 months prior to surgery to exclude any unsuspected pathology - Barrett's esophagus or adenocarcinoma. An esophageal motility study is indicated to rule out a primary motor disorder (e.g. achalasia, scleroderma) when suspected and to rule out aperistalsis, which may result in post-operative dysphagia after some forms of fundoplication.

Extended Matching Questions (EMQs)

1. Abdominal pain

- | | |
|-------------------------|----------------------------|
| A. Acute cholecystitis | H. Large bowel obstruction |
| B. Acute pancreatitis | I. Mesenteric adenitis |
| C. Aortic dissection | J. Perforated viscus |
| D. Appendicitis | K. Renal colic |
| E. Colorectal carcinoma | L. Small bowel obstruction |
| F. Diverticulosis | M. Ulcerative colitis |
| G. Duodenal ulcer | |

For each clinical scenario below, give the most likely cause for the clinical findings. Each option may be used only once.

1. A 45-year-old man with a history of gallstones presents in emergency with severe epigastric pain radiating to the back and vomiting.
2. A 28-year-old man presents with sharp left loin and left upper quadrant pain radiating to the groin. He is not jaundiced.
3. A 44-year-old woman presents with continuous right upper quadrant pain, vomiting and fever. Murphy's sign is positive.
4. A 26-year-old man with a previous history of abdominal surgery presents with colicky central abdominal pain, rapidly followed by production of copious bile-stained vomitus.
5. A 50-year-old man presents with epigastric pain worse at night and relieved by eating or drinking milk.

Answer: B K A L G

- 1- A 45-year-old man with a history of gallstones presents to casualty with severe epigastric pain radiating to the back and vomiting.

Answer is B: Severe epigastric pain radiating to the back is the classic description of acute pancreatitis. Gallstones and alcohol are its two most common causes. Serum amylase is usually significantly raised but this is not specific because amylase can be raised with other conditions that present with an acute abdomen, such as cholecystitis and perforated viscus.

- 2- A 28-year-old man presents with sharp left loin and left upper quadrant pain radiating to the groin. He is not jaundiced.

Answer is K: Renal colic is severe and often associated with nausea and vomiting. It is very important to provide adequate analgesia and morphine may be required.

- 3- A 44-year-old woman presents with continuous right upper quadrant pain, vomiting and fever. Murphy's sign is positive.

Answer is A: Murphy's sign is an indicator of acute cholecystitis. The hand is placed over the right upper quadrant and the patient is asked to breathe in. The pain resulting from the inflamed gallbladder moving downwards and striking the hand is severe and arrests the inspiratory effort.

- 4- A 26-year-old man with a previous history of abdominal surgery presents with colicky central abdominal pain, rapidly followed by production of copious bile-stained vomitus.

Answer is L: There is usually early onset of vomiting and late development of distension in small bowel obstruction. An abdominal radiograph may show distended loops proximal to the obstruction and lack of gas in the large bowel. In large bowel obstruction vomiting only occurs later and is mixed with faeces.

- 5- A 50-year-old man presents with epigastric pain worse at night and relieved by eating or drinking milk.

Answer is G: Classically the pain of duodenal ulceration is described as being relieved by eating, whereas the pain of gastric ulceration is described as worsening on eating. In practice it is difficult to identify the site of ulceration based on such information. Helicobacter pylori infection and chronic non-steroidal anti-inflammatory drug (NSAID) use are important risk factors for duodenal ulceration. Nearly all duodenal ulcers are Helicobacter pylori positive.

2. Abdominal pain

- | | |
|-------------------------------|-----------------------------------|
| A. Acute appendicitis | H. Pneumothorax |
| B. Carcinoma of sigmoid colon | I. Primary biliary cirrhosis |
| C. Crohn's disease | J. Primary sclerosing cholangitis |
| D. Gastric ulcer | K. Small bowel obstruction |
| E. Hepatitis | L. Ulcerative colitis |
| F. Irritable bowel syndrome | M. Umbilical hernia |
| G. Perforated duodenal ulcer | |

For each clinical scenario below, give the most likely cause for the clinical findings. Each option may be used only once.

1. A 21-year-old student presents with a cramping diffuse abdominal pain associated with alternating constipation and diarrhoea. Investigations are normal.

2. A 55-year-old smoker presents with severe epigastric pain. The chest radiograph reveals air under the diaphragm.

3. A 19-year-old girl presents with fever, nausea and right iliac fossa pain. She says that the pain 'was around the umbilicus before'.

4. A 35-year-old man presents with weight loss, diarrhoea and abdominal pain. On examination, he has aphthous ulcers in the mouth and a mass is palpable in the right iliac fossa. Blood tests reveal low serum vitamin B12 and folate.

5. A 45-year-old woman on treatment for TB presents with abdominal pain and malaise. On examination she is jaundiced.

Answers: F G A C E

1- A 21-year-old student presents with a cramping diffuse abdominal pain associated with alternating constipation and diarrhoea. Investigations are normal.

Answer is F: Irritable bowel syndrome is associated with a stressful lifestyle. Younger women (under 40) are more frequently affected. The patient may report pain relief after defecating/passing flatus.

2- A 55-year-old smoker presents with severe epigastric pain. The chest radiograph reveals air under the diaphragm.

Answer is G: Air under the diaphragm can be seen with any perforated viscus.

3- A 19-year-old girl presents with fever, nausea and right iliac fossa pain. She says that the pain 'was around the umbilicus before'.

A: This is a classic presentation of appendicitis, with a central colicky abdominal pain that shifts to the right iliac fossa once the peritoneum becomes inflamed. Rebound tenderness can be elicited with appendicitis. As the appendix may lie in various positions (e.g. retrocecal, paracaecal, retrocolic, pelvic), pain may sometimes be elicited by rectal/vaginal examination. Treatment involves prompt appendicectomy.

4- A 35-year-old man presents with weight loss, diarrhoea and abdominal pain. On examination, he has aphthous ulcers in the mouth and a mass is palpable in the right iliac fossa. Blood tests reveal low serum vitamin B12 and folate.

Answer is C: Crohn's disease is a chronic transmural inflammatory gastrointestinal disease that can result in skip lesions anywhere from the mouth (aphthous ulceration) to the anus (e.g. fissuring/fistulae), but favors the terminal ileum/proximal colon. Small bowel disease can lead to malabsorption, e.g. iron, vitamin B12 and folate.

5- A 45-year-old woman on treatment for TB presents with abdominal pain and malaise. On examination she is jaundiced.

Answer is E: Pyrazinamide, isoniazid and rifampicin are all recognized causes of drug-induced hepatitis.

3. Epigastric pain

- | | |
|---------------------------------|----------------------------|
| A. Acute cholecystitis | G. Myocardial infraction |
| B. Acute intermittent porphyria | H. Peptic ulceration |
| C. Acute pancreatitis | I. Reflux esophagitis |
| D. Crohn's disease | J. Ulcerative colitis |
| E. Hirschsprung's disease | K. Urinary tract infection |
| F. Lower lobe pneumonia | L. Viral hepatitis |

For each clinical scenario below, give the most likely cause for the clinical findings. Each option may be used only once.

1. A 48-year-old woman reports an epigastric pain that becomes more severe with large meals and is relieved by hunger. ☐
2. An obese 49-year-old woman reports severe epigastric and right hypochondrial pain radiating to right shoulder and associated with vomiting. ☐
3. A 19-year-old boy complains of weakness and inability to study. When examined, he has a tender epigastrium and slight Jaundice. ☐
4. A 26-year-old man reports epigastric pain that is worsened with water brash. He complains of a nocturnal cough that's bothering for 6 months. ☐
5. A 30-year-old woman who has a 4-month history of steatorrhea and easy fatigability has complained of epigastric pain. She is a smoker and smokes 10 cigarettes a day. ☐

Answers: H A L I D

4. Causes of Acute Pancreatitis

- | | |
|-------------------------|-------------------------|
| A. Alcohol | G. Iatrogenic |
| B. Cystic fibrosis | H. Mumps |
| C. Gall stones | I. Pancreatic carcinoma |
| D. Hypercalcemia | J. Polyarteritis nodosa |
| E. Hypertriglyceridemia | K. Thiazide diuretics |
| F. Hypothermia | |

For each clinical scenario below, give the most likely cause for the clinical findings. Each option may be used only once.

1. A 15- year- old girl with a history of recurrent chest infections and sinusitis presents with acute abdominal pain. ☐
2. A 45- year- old obese woman with a history of recurrent pain in the right hypochondrium. ☐
3. A 38- year- old driver presents with recurrent central abdominal pain, diarrhoea and bleeding per rectum. Three weeks earlier, he had had flu- like illness with productive cough and myalgia. Chest examination shows bilateral inspiratory wheezes. ☐
4. A 65- year- old man presents with progressive jaundice, anorexia and weight loss. ☐
5. A 49- year- old woman presents with polyuria, hematuria, abdominal pain and bone aches. On examination her blood pressure is 170/100 mmHg. ☐

Answers: B C J I D

1. A 15-year-old girl with a history of recurrent chest infections and sinusitis presents with acute abdominal pain.

Answer is B: Cystic fibrosis can be diagnosed before birth by genetic testing or by a sweat test in early childhood.

2. A 45-year-old obese woman with a history of recurrent pain in the right hypochondrium.

Answer is C: Recurrent right hypochondrial pain in a female above 40 points to gallstones.

3. A 38-year-old driver presents with recurrent central abdominal pain, diarrhoea and bleeding per rectum. Three weeks earlier, he had had flu-like illness with productive cough and myalgia. Chest examination shows bilateral inspiratory wheezes.

Answer is J: Diagnosing polyarteritis nodosa is supported by tests that indicate inflammation, including elevation of blood sedimentation rate and C-reactive protein. The white blood cell count and platelet count can be elevated, while the red blood count is decreased. Hepatitis B virus testing can be positive in 10%-20% of patients with polyarteritis nodosa. Urine testing can show protein and red blood cells. The diagnosis is confirmed by a biopsy of involved tissue that reveals vasculitis.

4. A 65-year-old man presents with progressive jaundice, anorexia and weight loss.

Answer is I: Painless jaundice occurs when cancer of the head of the pancreas (about 60% of cases) obstructs the common bile duct. Carcinoma of the body or tail of the pancreas is typically associated with epigastric pain radiating to the back.

5. A 49-year-old woman presents with polyuria, hematuria, abdominal pain and bone aches. On examination her blood pressure is 170/100 mmHg.

Answer is D: There is a general mnemonic for remembering the effects of hypercalcaemia: groans (constipation), moans (e.g. fatigue, lethargy and depression), bones (bone pain, especially if PTH is elevated), stones (kidney stones) and psychiatric overtones (including depression and confusion).

5. Abdominal masses

- | | |
|------------------------------|--------------------------|
| A. Abdominal aortic aneurysm | G. Ovarian carcinoma |
| B. Caecal carcinoma | H. Ovarian cyst |
| C. Diverticulosis | I. Pancreatic pseudocyst |
| D. Fibroids | J. Psoas abscess |
| E. Gastric carcinoma | K. Renal cell carcinoma |
| F. Hepatocellular carcinoma | L. Sigmoid carcinoma |

For each clinical scenario below, give the most likely cause for the clinical findings. Each option may be used only once.

1. A 65-year-old man collapses in the street. On examination he has an umbilical mass that is expansile and pulsatile. ☐

2. A 75-year-old man with a 3-month history of dyspepsia presents with weight loss and abdominal distension. On examination a 3.5 cm, hard, irregular, tender epigastric mass can be felt which moves on respiration. Percussion of the distended abdomen reveals shifting dullness. The left supraclavicular node is palpable. ☐

3. A 70-year-old woman presents with a mass in the right iliac fossa and severe microcytic anaemia. On examination the mass is firm, irregular and 4 cm in diameter. The lower edge is palpable. ☐

4. A 35-year-old alcoholic presents with a 1-month history of epigastric pain, fullness and nausea. He has previously had two or three episodes of severe epigastric pain associated with vomiting. Examination reveals a large, slightly tender, rather indistinct mass in the upper abdomen with no other specific features. ☐

5. A 53-year-old man presents with a 10-day history of increasing jaundice and pruritus. Direct questioning reveals that he has become increasingly constipated over the past year with some loss of appetite and weight. Examination reveals a large, hard, irregular mass in the right upper quadrant and epigastrium which moves on respiration and is dull to percussion and a further mass in the left iliac fossa. ☐

Answers: A E B I L

1- A 65-year-old man collapses in the street. On examination he has an umbilical mass that is expansile and pulsatile.

Answer is A: The presence of an expansile and pulsatile mass implies the presence of an aneurysm. A true aneurysm is lined by all three layers of the arterial wall, whereas a false aneurysm (caused by trauma, infection, etc.) is lined only by connective tissue.

2- A 75-year-old man with a 3-month history of dyspepsia presents with weight loss and abdominal distension. On examination a 3.5 cm. hard, irregular, tender epigastric mass can be felt which moves on respiration. Percussion of the distended abdomen reveals shifting dullness. The left supraclavicular node is palpable.

Answer is F: Gastric carcinoma should always be considered in a patient complaining of dyspepsia for over a month in someone at this age. The presence of Virchow's node (left supraclavicular node) and ascites implies disseminated disease and thus carries a poor prognosis. This finding is sometimes referred to as a positive Troisier's sign.

3- A 70-year-old woman presents with a mass in the right iliac fossa and severe microcytic anaemia. On examination the mass is firm, irregular and 4 cm in diameter. The lower edge is palpable.

Answer is B: The predominant symptoms/signs of carcinoma vary depending on the site of colon affected. Right-sided lesions in the Caecum/ascending colon are associated with weight loss and anaemia, whereas symptoms of change in bowel habit and bleeding per rectum are more common in the sigmoid colon/rectum. The possibility of a caecal carcinoma must always be considered in a patient over 40 years of age presenting with a picture simulating acute appendicitis.

4- A 35-year-old alcoholic presents with a 1-month history of epigastric pain, fullness and nausea. He has previously had two or three episodes of severe epigastric pain associated with vomiting. Examination reveals a large, slightly tender, rather indistinct mass in the upper abdomen with no other specific features.

Answer is I: This patient has a pancreatic pseudocyst. This is a collection of pancreatic secretions that collect in the lesser sac, and is caused by pancreatitis (it is one of the classic complications of pancreatitis). The patient might give a history of acute pancreatitis or might present with epigastric fullness, pain, nausea and, sometimes, vomiting. Such cysts can become complicated by infection or hemorrhage.

5- A 53-year-old man presents with a 10-day history of increasing jaundice and pruritus. Direct questioning reveals that he has become increasingly constipated over the past year with some loss of appetite and weight. Examination reveals a large, hard, irregular mass in the right upper quadrant and epigastrium which moves on respiration and is dull to percussion and a further mass in the left iliac fossa.

Answer is L: This patient has a carcinoma of the sigmoid colon. The patient has presented with a late complication of the disease, ie extensive hepatic metastasis sufficient to obstruct biliary drainage. Colorectal cancer is the commonest cause of such intrahepatic obstruction. The patient therefore has two masses – the primary in the left iliac fossa and hepatomegaly.

6. Liver Diseases

- A. Acute viral hepatitis B
- B. Acute viral hepatitis E
- C. Antitrypsin deficiency
- D. Fulminant liver failure
- E. Hemochromatosis
- F. Hepatic encephalopathy

- G. Hepatic hemangioma
- H. Hepatocellular carcinoma
- I. Liver cirrhosis
- J. Liver metastasis
- K. Primary biliary cirrhosis
- L. Wilson's disease

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 69-year-old retired man presents with weight loss, fever and right upper quadrant pain. On examination, a hard, irregular liver can be felt on palpation. Serum AFP is grossly elevated. ☐

2. A 45-year-old man presents with arthralgia, tiredness and development of diabetes. On examination his skin is pigmented and blood tests show increased serum ferritin. ☐

3. A 60-year-old man presents with signs of spider naevi, gynaecomastia and testicular atrophy. His hands show clubbing and leukonychia. ☐

4. A 20-year-old man with a history of liver problems in the past presents with tremors and dysarthria with developing dyskinesia. Slit-lamp examination reveals a greenish-brown ring at the corneoscleral junction. ☐

5. A 50-year-old man presents with signs of chronic liver disease with a history of early onset pulmonary emphysema. He is a non-smoker. His father had a similar history. ☐

Answers: H E I L C

1- A 69-year-old retired man presents with weight loss, fever and right upper quadrant pain. On examination, a hard, irregular liver can be felt on palpation. Serum AFP is grossly elevated.

Answer is H: Liver metastases and conditions associated with Macronodular cirrhosis may give rise to a hard irregular liver. The significantly raised α -fetoprotein (AFP) is suggestive of hepatocellular carcinoma. Hepatitis and chronic cardiac failure are usually associated with a smooth rather than an irregular hepatomegaly.

2- A 45-year-old man presents with arthralgia, tiredness and development of diabetes. On examination his skin is pigmented and blood tests show increased serum ferritin.

Answer is E: Hemochromatosis is an autosomal recessively inherited disorder of iron metabolism that most commonly presents in middle-aged men. The presentation can be very non-specific in the early stages, e.g. lethargy, joint pain. Later the classic features of chronic liver disease and 'bronze diabetes' (hence pigmentation) may become apparent. Hemochromatosis can also cause a dilated cardiomyopathy, resulting in heart failure. Blood tests show a raised serum iron and ferritin with decreased total iron-binding capacity. Radiographs of the painful joints may show signs of chondrocalcinosis. Venesection plays an important role in long-term management to maintain the hematocrit and ferritin within normal ranges.

3- A 60-year-old man presents with signs of spider naevi, gynaecomastia and testicular atrophy. His hands show clubbing and leukonychia.

Answer is I: Other signs of chronic liver disease include palmar erythema and parotid enlargement.

4- A 20-year-old man with a history of liver problems in the past presents with tremor and dysarthria with developing dyskinesia. Slit-lamp examination reveals a greenish-brown ring at the corneal scleral junction.

Answer is L: Wilson's disease is an autosomal recessive condition characterized by toxic accumulation of copper in the liver and brain. The characteristic eye sign described in the question is a Kaiser-Fleischer ring, which is best observed under slit-lamp examination and is virtually pathognomonic of Wilson's disease. It is a greenish-browning that can be seen at the corneal scleral junction. It is caused by copper deposition in Descemet's membrane. Neurological problems may manifest as dementia, tremor, dyskinesia, etc. Management of Wilson's disease involves long-term treatment with a copper-chelating agent such as penicillamine.

5- A 50-year-old man presents with signs of chronic liver disease with a history of early onset pulmonary emphysema. He is a non-smoker. His father had a similar history.

Answer is C: α 1 Antitrypsin deficiency is an autosomal dominant inherited condition that characteristically affects the lungs and the liver. Pulmonary emphysema and its complications are the major cause of mortality in these individuals. The most common pattern of emphysema that is seen in hospitals is centrilobular/centriacinar emphysema which is smoking related. The damage is predominantly in the respiratory bronchioles with relative preservation of the alveoli. However, α -antitrypsin deficiency is associated with much rarer panacinar emphysema that involves the destruction of whole alveoli and predominantly affects the lung bases. As smoking promotes the inactivation of alpha 1 -antitrypsin, it results in the patient developing emphysema earlier.

7. Liver Diseases

- | | |
|-----------------------------|-----------------------------------|
| A. Chronic active hepatitis | G. Hepatocellular carcinoma |
| B. Dubin-Johnson syndrome | H. Pancreatic carcinoma |
| C. Galactosemia | I. Primary biliary cirrhosis |
| D. Gaucher's disease | J. Primary sclerosing cholangitis |
| E. Gilbert's syndrome | K. Wilson's disease |
| F. Hemochromatosis | |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 48-year-old man presents with a dull aching pain in the right hypochondrium, which he has had for 3 weeks. Other complaints include impotence, arthritis, lethargy and weight loss. ☐
2. A 47-year-old alcoholic presents with weight loss, fever, ascites and pain in the right hypochondrium. Abdominal ultrasound shows a focal lesion in a cirrhotic liver. Serum AFP is grossly elevated. ☐
3. A 41-year-old man with known ulcerative colitis presents with progressive abdominal pain and itching. On examination he was jaundiced. ☐
4. A 35-year-old woman presents with jaundice and painless depigmented patches on her hands, neck and face. On examination multiple spider naevi were noted. ☐
5. A 27-year-old nurse presents with jaundice a few weeks after starting oral contraception. She gave no history of exposure to halothane. Hepatitis serology was negative. Alanine aminotransferase (ALT) and aspartate aminotransferase (AST) were normal but urine showed bilirubinuria. ☐

Answers: F G J A B

1. A 48-year-old man presents with a dull aching pain in the right hypochondrium, which he has had for 3 weeks. Other complaints include impotence, arthritis, lethargy and weight loss.

Answer is F: Hereditary hemochromatosis is an autosomal recessive disease with estimated prevalence in the population of 0.2% in Caucasians. The gene responsible for hereditary hemochromatosis (known as HFE gene) is located on chromosome 6.

2. A 47-year-old alcoholic presents with weight loss, fever, ascites and pain in the right hypochondrium. Abdominal ultrasound shows a focal lesion in a cirrhotic liver. Serum AFP is grossly elevated.

Answer is G: HCC most commonly appears in a patient with chronic viral hepatitis B or C and/or alcoholics with cirrhosis.

3. A 41-year-old man with known ulcerative colitis presents with progressive abdominal pain and itching. On examination he was jaundiced.

Answer is J: PSC is closely linked with ulcerative colitis. The definitive treatment is liver transplantation.

4. A 35-year-old woman presents with jaundice and painless depigmented patches on her hands, neck and face. On examination multiple spider naevi were noted.

Answer is A: Chronic active hepatitis or autoimmune hepatitis occurs in adults and children, with two peaks of incidence at age 10-20 years and again at age 45-70 years. Systemic or cutaneous abnormalities occur in 25% of patients.

5. A 27-year-old nurse presents with jaundice a few weeks after starting oral contraception. She gave no history of exposure to halothane. Hepatitis serology was negative. Alanine aminotransferase (ALT) and aspartate aminotransferase (AST) were normal but urine showed bilirubinuria.

Answer is B: Dubin-Johnson syndrome is an autosomal recessive disorder that causes an increase of conjugated bilirubin without elevation of liver enzymes (ALT, AST). This condition is associated with a defect in the ability of hepatocytes to secrete conjugated bilirubin into the bile. It is usually asymptomatic.

8. Jaundice

- | | |
|---------------------------|-----------------------------------|
| A. Autoimmune hepatitis | H. hepatocellular carcinoma |
| B. Dubin-Johnson syndrome | I. Iatrogenic hepatitis |
| C. Gilbert's syndrome | J. Primary biliary cirrhosis |
| D. Hemochromatosis | K. Primary sclerosing cholangitis |
| E. Hemolytic anaemia | L. Rotor syndrome |
| F. Hepatitis A | M. Wilson's disease |
| G. Hepatitis C | |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

- A 24-year-old presents with nausea, malaise and jaundice. On examination he has a moderate hepatosplenomegaly and tender cervical lymphadenopathy. He has dark urine and pale stools.
- A 35-year-old woman presents with fever, malaise and jaundice. On examination she has moderate hepatomegaly. She is anti-smooth muscle antibody and antinuclear antibody positive.
- A 25-year-old man presents with recurrent episodes of asymptomatic jaundice.
- A 14-year-old patient presents with anaemia and mild jaundice. Hb 7 g/dl, reticulocytes 14 per cent. Electrophoresis result is pending.
- A 45-year-old man with ulcerative colitis presents with jaundice, pruritus and abdominal pain. Alkaline phosphatase (ALP) is raised and anti-mitochondrial antibodies negative.

Answers F A C E K

1- A 24 year old man presents with nausea, malaise and jaundice. On examination he has moderate hepatosplenomegaly and tender cervical lymphadenopathy. He has dark urine and pale stools.

Answer is F: Hepatitis A is an RNA virus that is spread by the faecal-oral route. Treatment is supportive because the condition is usually self-limiting.

2- A 35-year-old woman presents with fever, malaise and jaundice. On examination she has moderate hepatomegaly. She is anti-smooth muscle antibody and antinuclear antibody positive.

Answer is A: Chronic autoimmune hepatitis occurs most frequently in women and has associations with many other autoimmune diseases. Type I disease is associated with the presence of antinuclear and/or anti-smooth muscle antibodies.

Immunosuppressive therapy, e.g. corticosteroids, azathioprine, can induce remission in most cases. The patient may eventually require liver transplantation (recurrence after transplantation is still possible).

3- A 25-year-old man presents with recurrent episodes of asymptomatic jaundice.

Answer is C: Patients with Gilbert's syndrome may describe a family history of asymptomatic jaundice. This condition involves an unconjugated hyperbilirubinemia where a rise in bilirubin is seen particularly on fasting, dehydration, illness, etc. It is thought to result from underactivity of UDP-glucuronyl transferase activity, an enzyme involved in the conjugation of bilirubin. It is important to educate patients that there is no underlying liver disease and that Gilbert's syndrome is essentially a benign condition.

4- A 14-year-old patient presents with anaemia and mild jaundice. Hb 7 g/dl, reticulocytes 14 per cent. Electrophoresis result pending.

Answer is E: Markers of hemolytic anaemia on a peripheral blood film include Reticulocytosis (caused by increased erythrocyte production), elevated serum unconjugated bilirubin, reduced plasma haptoglobin and increased urinary urobilinogen. Remember that urinary urobilinogen is absent in cholestatic jaundice.

5- A 45-year-old man with ulcerative colitis presents with jaundice, pruritus and abdominal pain. ALP is raised and anti-mitochondrial antibodies negative.

Answer is K: Anti-mitochondrial antibodies are associated with primary biliary cirrhosis not primary sclerosing cholangitis. There is an association of primary sclerosing cholangitis with HLA-B8 and -DR3. The fibrosis and strictures of the biliary tree give rise to a beaded appearance on endoscopic retrograde cholangiopancreatography (ERCP).

9. Weight Loss

- A. Carcinoma of the stomach
- B. Coeliac disease
- C. Crohn's disease
- D. Diabetes insipidus
- E. Diabetes mellitus
- F. Irritable bowel syndrome

- G. Lymphoma
- H. Pancreatic carcinoma
- I. Renal carcinoma
- J. Thyrotoxicosis
- K. Tuberculosis
- L. Ulcerative colitis

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 26-year-old woman complains of weight loss associated with diarrhoea and palpitations. Her pulse is irregular. ☐

2. A 30-year-old man complains of fever, weight loss, night sweats and persistent cough. ☐

3. A 55-year-old woman presents with abdominal pain, weight loss and fatty stools. She also complains of extremely uncomfortable itchy blisters on her knees and elbows. ☐

4. A 14-year-old boy presents with a history of weight loss and excessive thirst. ☐

5. A 45-year-old businessman presents with a 2-month history of intermittent fever and weight loss. He denies any pain or cough. Examination revealed generalized lymphadenopathy. Blood tests revealed an ESR of 110 mm/h with a normal full blood count, liver function, renal function and bone profile. ☐

Answers: J K B E G

- 1- A 26-year-old woman complains of weight loss associated with diarrhoea and palpitations. Her pulse is irregular.

Answer is J: Thyrotoxicosis is a well-recognized cause of atrial fibrillation and so thyroid function tests should always be carried out on first presentation.

- 2- A 30-year-old man complains of fever, weight loss, night sweats and persistent cough.

Answer is K: Those symptoms suggest T. B. Hemoptysis may also occur and can be profound.

- 3- A 55-year-old woman presents with abdominal pain, weight loss and fatty stools. She also complains of extremely uncomfortable itchy blisters on her knees and elbows.

Answer is B: Coeliac disease is also known as gluten-sensitive enteropathy and is characterized by villous atrophy, giving rise to malabsorption in the small bowel; this reverses with a gluten-free diet. There is a particularly strong association with the HLA-DR3 and -DQ2 haplotypes. Dermatitis herpetiformis (DH) is an immune-complex-mediated (IgA) bullous skin disease that is associated with coeliac disease. DH can be treated with oral dapsone in the acute setting, but can usually be managed without medication by maintaining a gluten-free diet.

Anti-endomysial antibodies have a high sensitivity and specificity for coeliac disease. Jejunal biopsy to detect villous atrophy, reversible on gluten removal from the diet, is the diagnostic investigation of choice.

- 4- A 14-year-old boy presents with a history of weight loss and excessive thirst.

Answer is E: Those symptoms suggest Type 1 DM.

- 5- A 45-year-old businessman presents with a 2-month history of intermittent fever and weight loss. He denies any pain or cough. Examination revealed generalized lymphadenopathy. Blood tests revealed an ESR of 110 mm/h with a normal full blood count, liver function, renal function and bone profile.

Answer is G: Generalized lymphadenopathy, intermittent fever and weight loss together with ESR > 100 suggest the diagnosis of lymphoma. A normal FBC makes leukemia unlikely while a normal bone profile makes multiple myeloma unlikely.

10. Dysphagia

- | | |
|-----------------------------|-----------------------------|
| A. Bulbar palsy | G. Obstructing foreign body |
| B. Caustic stricture | H. Pharyngeal pouch |
| C. Diffuse esophageal spasm | I. Plummer-Vinson syndrome |
| D. Esophageal achalasia | J. Retrosternal goitre |
| E. Esophageal carcinoma | K. Seventh nerve palsy |
| F. Globus hystericus | L. Sturge-Weber syndrome |

For each clinical scenario below, give the most likely cause for the clinical findings. Each option may be used only once.

- A 35-year-old woman presents with dysphagia for solid and liquids associated with regurgitation and weight loss. Barium swallow shows a dilated tapering esophagus. ☐
- A 65-year-old smoker presents with a history of severe esophagitis and gradually worsening dysphagia. ☐
- A 28-year-old woman presents with a feeling of a lump in her throat that causes some discomfort on swallowing. Examination and imaging of the pharynx and esophagus reveal no abnormality. ☐
- A 40-year-old man complains of intermittent dysphagia associated with chest pain. Barium swallow reveals a corkscrew esophagus. ☐
- A 55-year-old man presents with coughing when he tries to swallow. On examination he has a flaccid tongue with fasciculation. ☐

Answers: D E F C A

- 1- A 35-year-old woman presents with dysphagia for solid and liquids associated with regurgitation and weight loss. Barium swallow shows a dilated tapering esophagus.

Answer is D: Esophageal achalasia involves a failure of relaxation of the lower esophageal sphincter on the initiation of swallowing. There are degenerative changes in both the myenteric plexus and the vagus nerve. It is important to perform an esophagoscopy to exclude the possibility of carcinoma at the lower end of the esophagus. First-line treatment involves endoscopic balloon dilatation of the sphincter. Surgical treatment involves dividing the muscle at the lower end of the esophagus – known as a Heller's cardiomyotomy.

- 2- A 65-year-old smoker presents with a history of severe esophagitis and gradually worsening dysphagia.

Answer is E: This history is highly suggestive of carcinoma. Smoking is a risk factor.

- 3- A 28-year-old woman presents with a feeling of a lump in her throat that causes some discomfort on swallowing. Examination and imaging of the pharynx and esophagus reveal no abnormality.

Answer is F: Globus hystericus involves a classic description of a constant 'lump in my throat' sensation, but no abnormality can be found. Some patients describe a difficulty in swallowing whereas others claim that swallowing food/drinking liquids relieves the discomfort. The symptoms are often worse when the patient is feeling particularly stressed. It is important to rule out any other pathology before this diagnosis is made.

- 4- A 40-year-old man complains of intermittent dysphagia associated with chest pain. Barium swallow reveals a corkscrew esophagus.

Answer is C: There is abnormal contraction of the esophagus giving rise to the corkscrew appearance on barium swallow. Anti-spasmodic drugs can be prescribed but are not always helpful.

- 5- A 55-year-old man presents coughing when he tries to swallow. On examination he has a flaccid tongue with fasciculation.

Answer is A: There is difficulty in coordinating the swallowing movement. There is lower motor neuron weakness of the muscles supplied by the cranial nerve which lie in the medulla. The flaccid tongue with fasciculation indicates nerve X I involvement.

11. Lower GIT Bleeding

- | | |
|----------------------|---------------------------|
| A. Anal fissure | G. Infectious diarrhoea |
| B. Colonic carcinoma | H. Intussusception |
| C. Crohn's disease | I. Mallory-Weiss tear |
| D. Diverticulosis | J. Meyer-Betz syndrome |
| E. Hemophilia | K. Peutz-Jeghers syndrome |
| F. Hemorrhoids | L. Ulcerative colitis |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 62-year-old man presents with rectal bleeding and a year's history of left iliac fossa pain and change in bowel habit. There is no weight loss. ☐

2. A 30-year-old woman presents with a 3-month history of bloody diarrhoea and colicky abdominal pain. Colonoscopy shows diffuse mucosal erythema throughout the rectum and descending colon. Stool cultures are negative. ☐

1. A 35-year-old man presents with 2-week history of fever, cramping abdominal pain and bloody diarrhoea. ☐

2. A 60-year-old man complains of tiredness and significant weight loss. He notes episodes of rectal bleeding with blood mixed with stool over the last few weeks. There is no diarrhoea. ☐

3. A 21-year-old man presents with a history of constipation and rectal bleeding. On examination there are numerous dark freckles on the palm, lips and oral mucosa. ☐

Answers: D L G B K

- 1- A 62-year-old man presents with rectal bleeding and a year's history of left iliac fossa pain and change in bowel habit. There is no weight loss.

Answer is D: Diverticular disease mainly occurs in the sigmoid colon. A high-fibre diet helps to prevent the high intraluminal pressures that are believed to cause diverticula.

- 2- A 30-year-old woman presents with a 3-month history of bloody diarrhoea and colicky abdominal pain. Colonoscopy shows diffuse mucosal erythema throughout the rectum and descending colon. Stool cultures are negative.

Answer is L: Ulcerative colitis mostly affects the rectum and descending colon usually presents with bloody diarrhoea in young or middle aged person.

- 3- A 35-year-old man presents with a 2-week history of fever, cramping abdominal pain and bloody diarrhoea.

Answer is G: The acute history makes infectious diarrhoea the most likely cause. Stool sample for microscopy, culture and sensitivity is the investigation of choice. If the patient is systemically unwell, antibiotics (e.g. empirical treatment with ciprofloxacin) may be started before diagnosis is confirmed.

- 4- A 60-year-old man complains of tiredness and significant weight loss. He notes episodes of rectal bleeding with blood mixed with stool over the last few weeks. There is no diarrhoea.

Answer is B: old age, bleeding per rectum and weight loss is red flags for Cancer Colon

- 5- A 21-year-old man presents with a history of constipation and rectal bleeding. On examination there are numerous dark freckles on the palm, lips and oral mucosa.

Answer is K: Circum-oral pigmentation & freckles together with bleeding per rectum point to intestinal hamartomas Peutz Jeghers syndrome.

12. Hematemesis

- | | |
|-------------------------|-------------------------------|
| A. Aortoenteric fistula | G. Gastric ulcer |
| B. Barrett's esophagus | H. Infectious gastritis |
| C. Crohn's disease | I. Mallory-Weiss tear |
| D. Duodenal ulcer | J. Osler-Weber-Rendu syndrome |
| E. Esophageal varices | K. Peutz-Jeghers syndrome |
| F. Gastric carcinoma | |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 50-year-old man with known history of chronic hepatitis C complains of vomiting blood. On examination he has signs of chronic liver disease. ☐
2. A 55-year-old businessman complains of epigastric pain worse at night which is relieved by eating. He has started vomiting small amounts of blood. ☐
3. A 60-year-old woman with a several year history of heartburn presents with occasional hematemesis. Endoscopy reveals intestinal-type metaplasia at the distal esophagus. ☐
4. A 40-year-old woman presents with hematemesis after a bout of prolonged vomiting. ☐
5. A 60-year-old woman with pernicious anaemia presents with a 2-month history of dyspepsia, weight loss and hematemesis. Examination reveals an enlarged left supraclavicular node. ☐

Answers: E D B I F

- 1- A 50-year-old man who has history of chronic hepatitis C complains of vomiting blood. On examination he has signs of chronic liver disease.

Answer is E: Portal hypertension causes the diversion of blood through portosystemic anastomoses and the development of esophageal varices. Liver cirrhosis is by far the most common cause of esophageal varices.

- 2- A 55-year-old businessman complains of epigastric pain worse at night, which is relieved by eating. He has started vomiting small amounts of blood.

Answer is D: Symptoms of duodenal ulcer are often relieved by eating, drinking milk, etc., whereas gastric ulcer symptoms are often aggravated by eating.

- 3- A 60-year-old woman with a several year history of heartburn presents with occasional hematemesis. Endoscopy reveals intestinal-type metaplasia at the distal esophagus.

Answer is B: Barrett's esophagus is the term used to describe the presence of specialized intestinal metaplasia in the esophagus (squamous to columnar) secondary to chronic reflux esophagitis. There is an increased risk of developing adenocarcinoma of the esophagus (40-fold increase is often quoted but the overall risk is still low).

Treatment involves the use of medication used to treat reflux esophagitis (proton pump inhibitors, H-2 receptor antagonists, etc.) and also laser therapy to ablate intestinal metaplasia and allow regrowth of squamous epithelium.

- 4- A 40-year-old woman presents with hematemesis after a bout of prolonged vomiting.

Answer is I: A Mallory-Weiss tear is a mucosal tear at the gastro-esophageal junction secondary to a sudden increase in pressure in that area usually mediated by a bout of severe coughing or vomiting. Alcohol bingeing and consequent vomiting is a major cause of Mallory-Weiss tear. Actively bleeding tears can be treated at endoscopy with electrocoagulation. Antiemetic therapy provides the mainstay of medical treatment.

- 5- A 60-year-old woman with pernicious anaemia presents with a 2-month history of dyspepsia, weight loss and hematemesis. Examination reveals an enlarged left supraclavicular node.

Answer is F: Pernicious anaemia (a condition characterized by atrophy of gastric mucosa and lack of intrinsic factor) is a risk factor for gastric carcinoma. Other risk factors include smoking and partial gastrectomy. An enlarged left supraclavicular node is known as a Virchow node and is an indicator of poor prognosis.

13. Hematemesis

- | | |
|-------------------------|--------------------------|
| A. Crohn's disease | G. Gastric ulcer |
| B. Duodenal ulcer | H. Hemophilia |
| C. Esophageal carcinoma | I. Mallory-Weiss tear |
| D. Esophageal varices | J. Meckel's diverticulum |
| E. Esophagitis | K. Vascular malformation |
| F. Gastric carcinoma | |

For each clinical scenario below, give the most likely cause for the clinical findings. Each option may be used only once.

1. A 53-year-old unemployed alcoholic presents with hematemesis, a history of alcoholic liver disease and ascites. ☐
2. A 77-year-old man with a history of dysphagia, mainly to solid food, and weight loss for 4 months. ☐
3. A 59-year-old bank manager with a long history of indigestion presents with hematemesis, severe constant epigastric pain and weight loss. ☐
4. A 34-year-old man presents with hematemesis, a history of back pain, arthritis, diarrhoea and weight loss. ☐
5. A 37-year-old man presents to ER with hematemesis after an episode of severe coughing. On examination he was very drunk and drowsy but there were no signs of chronic liver disease. ☐

Answers: D C F A I

1. A 53-year-old unemployed alcoholic presents with hematemesis, a history of alcoholic liver disease and ascites.

Answer is D: Esophageal varices are most often a consequence of portal hypertension, commonly due to cirrhosis.

2. A 77-year-old man with a history of dysphagia, mainly to solid food, and weight loss for 4 months.

Answer is C: Dysphagia to solids always requires urgent referral to exclude esophageal cancer.

3. A 59-year-old bank manager with a long history of indigestion presents with hematemesis, severe constant epigastric pain and weight loss.

Answer is F: Those are typical features of gastric cancer.

4. A 34-year-old man presents with hematemesis, a history of back pain, arthritis, diarrhoea and weight loss.

Answer is A: Crohn's disease may affect any part of the gastrointestinal tract from mouth to anus. It is associated with seronegative spondyloarthritis.

5. A 37-year-old man presents to ER with hematemesis after an episode of severe coughing. On examination he was very drunk and drowsy but there were no signs of chronic liver disease.

Answer is I: Mallory-Weiss syndrome refers to bleeding from tears in the mucosa at the junction of the stomach and esophagus, usually caused by severe retching, coughing or vomiting.

14. Diarrhea

- | | |
|-------------------------------|-----------------------------|
| A. Coeliac disease | G. Irritable bowel syndrome |
| B. Crohn's disease | H. Lactose intolerance |
| C. Cystic fibrosis | I. Laxative abuse |
| D. Diverticulitis | J. Pseudomembranous colitis |
| E. Gastroenteritis | K. Thyrotoxicosis |
| F. Inflammatory bowel disease | L. Ulcerative colitis |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 19-year-old man presents with a 2-day history of vomiting and watery diarrhoea.

2. A 75-year-old patient treated with broad-spectrum antibiotics presents a few days later with bloody diarrhoea.

3. An anxious 31-year-old woman complains of a history of chronic diarrhoea alternating with constipation. She often feels bloated. Investigations are normal.

4. A 17-year-old man presents with symptoms of chronic diarrhoea and smelly stools. He has a history of recurrent chest infections as a child.

5. A 35-year-old woman with diabetes presents with weight loss, diarrhoea and angular stomatitis. Blood tests reveal presence of anti-gliadin antibodies.

Answers: E J G C A

1- A 19-year-old man presents with a 2-day history of vomiting and watery diarrhoea.

Answer is E: Stool microscopy and culture is particularly important. Management should involve maintaining good oral fluid intake to replace fluids lost in diarrhoea and vomiting. Antibiotics are indicated if the patient is systemically unwell.

2- A 75-year-old patient treated with broad-spectrum antibiotics presents a few days later with bloody diarrhoea.

Answer is J: Pseudomembranous colitis (PMC) is caused by overgrowth of *Clostridium difficile* after antibiotic therapy. An important primary measure is to discontinue the suspected antibiotics because this can sometimes be sufficient to relieve symptoms. Metronidazole is the treatment of choice.

3- An anxious 31-year-old woman complains of a history of chronic diarrhoea alternating with constipation. She often feels bloated. Investigations are normal.

Answer is G: Irritable bowel syndrome is often more severe during times of stress. Some patients report relief of abdominal pain on passing flatus/defecation. Women are more frequently affected than men.

4- A 17-year-old man presents with symptoms of chronic diarrhoea and smelly stools. He has a history of recurrent chest infections as a child.

Answer is C: Those symptoms point to Cystic Fibrosis

5- A 35-year-old woman with diabetes presents with weight loss, diarrhoea and angular stomatitis. Blood tests reveal presence of anti-gliadin antibodies.

Answer is A: Anti gliadin antibodies, Iron deficiency Anemia, and Type 1 DM point to coeliac disease.

15. Constipation

- A. Caecal carcinoma
- B. Chagas' disease
- C. Colorectal carcinoma
- D. Diverticular disease
- E. Ferrous sulphate
- F. Folate supplements

- G. Hypercalcemia
- H. Hyperkalemia
- I. Hypokalemia
- J. Hypothyroidism
- K. Irritable bowel syndrome

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. An 80-year-old woman presents with thirst, tiredness, depression, bone pain and constipation. ☐

2. A 65-year-old man presents with a 3-month history of weight loss, altered bowel habit and bleeding per rectum. ☐

3. A 42-year-old woman complains of weight gain, constipation, cold intolerance and depression. ☐

4. A 65-year-old woman presents with constipation and colicky left-sided abdominal pain relieved by defecation. ☐

5. A 21-year-old woman presenting with weakness and lethargy has been successfully treated for anaemia. She now complains of constipation and black stools. ☐

Answers: G C J D E

- 1- An 80-year-old woman presents with thirst, tiredness, depression, bone pain and constipation.

Answer is G: Hypercalcaemia is also a well-recognized cause of confusion. Intravenous saline, furosemide (frusemide) and bisphosphonates can be used to lower serum calcium.

- 2- A 65-year-old man presents with a 3-month history of weight loss, altered bowel habit and bleeding per rectum.

Answer is C: A patient with this history should be referred for colonoscopy as soon as possible.

- 3- A 42-year-old woman complains of weight gain, constipation, cold intolerance and depression.

Answer is J: Symptoms of hypothyroidism include cold intolerance, weight gain, hoarse voice, menorrhagia, constipation and depression. On examination the patient may have the typical coarse facial features. Signs include bradycardia, goitre, non-pitting edema, particularly over the eyelids, peripheral neuropathy and slowly relaxing reflexes. Hypothyroidism can also present as an emergency with confusion/coma (myxoedema coma). The patient may be hypothermic and hypoglycemic and have chronic cardiac failure. Thyroid replacement therapy should be initiated gradually to prevent complications.

- 4- A 65-year-old woman presents with constipation and colicky left-sided abdominal pain relieved by defecation.

Answer is D: Diverticulae are herniations of the gut wall (usually at the sigmoid colon) that probably result from high intraluminal pressures. Diverticular disease is far more prominent in western countries compared with those countries that adopt a diet containing more fibre. It is believed that a low-fibre diet contributes to raised intraluminal pressure and the development of diverticulae. The incidence increases with age. The main complications to look out for are the development of inflammation (diverticulitis) and perforation. Remember that barium enema is contraindicated if diverticulitis is suspected (fever, raised C-reactive protein or CRP, raised white cell count, etc.) because of the risk of perforation.

- 5- A 21-year-old woman presenting with weakness and lethargy has been successfully treated for anaemia. She now complains of constipation and black stools.

Answer is E: Ferrous sulphate (iron tablets) is a common cause of constipation and black stools. Before embarking on invasive investigations it is important to ask about the drug history of the patient.

16. Abnormal Abdominal Radiograph

- | | |
|---------------------------------|----------------------------|
| A. acute appendicitis | G. perforated ulcer |
| B. chronic pancreatitis | H. pyloric stenosis |
| C. Crohn's disease | I. sigmoid volvulus |
| D. diverticulosis | J. small bowel obstruction |
| E. gluten-sensitive enteropathy | K. ulcerative colitis |
| F. intussusception | |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 55 year old with a history of epigastric discomfort of several months presents acutely unwell in casualty. His radiograph shows free gas under the diaphragm. ☐
2. Abdominal film of an elderly constipated woman shows an 'inverted U' loop of bowel. ☐
3. A 31-year-old man presents with fever and bloody diarrhoea. He is tachycardic and has Hb of 10.0 g/dl. Abdominal film shows loss of haustral pattern and a colonic dilatation of 8 cm. ☐
4. A 26-year-old student presents with bloody diarrhoea, abdominal pain and weight loss. Barium enema reveals 'cobble-stoning' and colonic strictures. ☐

Answers: G I K C

- 1- A 55 year old with a history of epigastric discomfort of several months presents acutely unwell in casualty. His radiograph shows free gas under the diaphragm.

Answer is G: Free gas under the diaphragm could result from any perforated viscus, e.g. colon and is not specific for gastric/duodenal perforation.

- 2- Abdominal film of an elderly constipated woman shows an 'inverted U' loop of bowel.

Answer is I: The sigmoid colon is the most common site of volvulus in the gastrointestinal tract. The condition involves the sigmoid colon twisting around its mesenteric axis, causing obstruction. The condition tends to occur in elderly people. The condition can be treated by sigmoidoscopy and the insertion of a flatus tube per rectum to allow decompression.

- 3- A 31-year-old man presents with fever and bloody diarrhoea. He is tachycardic and has Hb of 10.0 g/dl. Abdominal film shows loss of haustral pattern and a colonic dilatation of 8 cm.

Answer is K: This is toxic megacolon and a presentation of severe ulcerative colitis.

- 4- A 26-year-old student presents with bloody diarrhoea, abdominal pain and weight loss. Barium enema reveals 'cobble-stoning' and colonic strictures.

Answer is C: bloody diarrhoea, abdominal pain, strictures, and cobble stoning are pathognomonic of Crohn's disease.

17. Treatment of Gastrointestinal Conditions

- | | |
|---------------------------------|-------------------------------|
| A. Clarithromycin, amoxicillin | G. Intravenous hydrocortisone |
| B. Clarithromycin, amoxicillin, | H. Intravenous prednisolone |
| C. Endoscopy | I. Lansoprazole |
| D. High-dose lansoprazole | J. Laparotomy |
| E. Ibuprofen four times daily | K. Low-dose omeprazole |
| F. Intravenous fluids only | L. Mebeverine |
| | M. Morphine |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 50-year-old man presenting with a perforated gastric ulcer.

2. A 55-year-old woman with severe esophagitis confirmed on endoscopy.

3. A 60-year-old man with cirrhosis presenting with hematemesis.

4. A 30-year-old man with ulcerative colitis presents to casualty with fever, tachycardia and abdominal distension.

5. A 24-year-old woman with suspected irritable bowel syndrome complains of colicky pain and bloating.

Answers: J D C G L

1- A 50-year-old man presenting with a perforated gastric ulcer.

Answer is J: This is a surgical emergency and requires laparotomy for surgical repair.

2- A 55-year-old woman with severe esophagitis confirmed on endoscopy.

Answer is D: High-dose proton pump inhibitor is indicated as first-line treatment to ensure healing. Once healed, low-dose therapy can be continued.

3- A 60-year-old man with cirrhosis presenting with hematemesis.

Answer is C: Acute upper gastrointestinal bleeding is most commonly caused by esophageal varices which necessitate upper gastrointestinal endoscopy.

4- A 30-year-old man with ulcerative colitis presents to casualty with fever, tachycardia and abdominal distension.

Answer is G: This is presentation of severe ulcerative colitis and intravenous hydrocortisone is indicated. Other markers of a severe attack are anaemia, marked rectal bleeding and an ESR significantly raised from baseline. When the patient improves after a few days, oral prednisolone and a maintenance agent such as sulfasalazine (sulphasalazine) can be prescribed.

5- A 24-year-old woman with suspected irritable bowel syndrome complains of colicky pain and bloating.

Answer is L: Mebeverine is an anti-spasmodic agent and relieves symptoms in some patients. This agent has the advantage of relaxing intestinal smooth muscle without anti-cholinergic side effects.

Short Heading Questions (SHQs)

1- Roseberry tongue is found in

- A. scarlet fever
- B. Glandular fever
- C. Yellow fever
- D. Rheumatic fever
- E. infective endocarditis

2- All of the following are examples of psychiatric illness associated with profound weight loss except

- A. Anorexia nervosa
- B. Schizophrenia
- C. Sheehan's syndrome
- D. Depression
- E. Bulimia

3- Hepatocellular jaundice does not result from

- A. Rifampicin
- B. Copper sulphate
- C. Halothane
- D. Chlorpropamide
- E. silymarin

4- Serum-ascites albumin gradient (SAAG) is > 1.1 g/dL in all **EXCEPT**

- A. Tuberculous peritonitis
- B. Congestive cardiac Failure
- C. Cirrhosis of liver
- D. Budd-Chiari syndrome
- E. Portal vein thrombosis

5- All of the following are associated with obstructive jaundice **EXCEPT**

- A. Oral contraceptives
- B. Pregnancy
- C. Crigler-Najjar type II
- D. Secondary carcinoma of liver
- E. Acetaminophen toxicity

6- Secretory diarrhea has no association with

- A. pancreatic insufficiency
- B. Zollinger-Ellison syndrome
- C. Villous adenoma of rectum
- D. Medullary carcinoma of thyroid
- E. Carcinoid syndrome

7- WBC in stool is not found in

- A. Giardiasis
- B. Shigella
- C. Campylobacter
- D. Enteroinvasive E. coli
- E. Viral gastroenteritis

8- Latent jaundice may be a feature of all EXCEPT

- A. Pernicious anaemia
- B. Acute pulmonary thromboembolism
- C. tropical sprue
- D. Congestive cardiac failure
- E. Pneumonia

9- Regarding hematochezia which one is FALSE:

- A. Passage of bright red blood per rectum
- B. May be due to rectal polyp, ulcerative colitis or angiodysplasia of colon
- C. The blood may not be mixed with stool
- D. Bleeding source is proximal to ligament of Treitz
- E. Diverticulitis is the commonest cause

10- Which is not a member of familial non-hemolytic hyperbilirubinemia?

- A. Rotor syndrome
- B. Rye's syndrome
- C. Dubin-johnson syndrome
- D. Gilbert's syndrome
- E. Crigler-Najjar syndrome type II

11- Regarding melena which statement is FALSE?

- A. At least 60 ml of blood is required
- B. Blood should remain at least 4 hours within the gut
- C. Black tarry semisolid stool
- D. Offensive in odour
- E. It may occur due to colonic lesions

12- Manometric study of lower esophagus is important in all EXCEPT

- A. Mallory-Weiss syndrome
- B. Polymyositis
- C. Diffuse esophageal spasm
- D. Achalasia cardia
- E. Crohn's disease

13- Achalasia cardia gives rise to all EXCEPT

- A. Chest pain
- B. Heartburn
- C. Dysphagia
- D. Regurgitation
- E. Diarrhea

14- Achalasia of the cardia may lead to all EXCEPT

- A. Pneumonia
- B. Lung abscess
- C. Emphysema
- D. Fibrosis of the lung
- E. Pleural effusion

15- Serum alkaline phosphatase is increased in all EXCEPT

- A. Paget's disease of bone
- B. Osteomalacia
- C. Sclerosing cholangitis
- D. osteoporosis
- E. Steatosis

16- Regarding H. Pylori, which statement is FALSE

- A. Gram -negative bacillus
- B. Multi flagellated
- C. It penetrates within the epithelial cell of the stomach
- D. Often resides in the dental plaques of the patient
- E. Diagnosed at endoscopy

17- Pyloric stenosis is commonly associated with all EXCEPT

- A. Bilious vomiting
- B. Obliteration of Traube's space tympanicity
- C. distension of upper abdomen with succussion splash
- D. Visible peristalsis.
- E. Alkalosis

18- Which statement is false regarding duodenal ulcer

- A. More common in first degree relatives of duodenal ulcer patient
- B. Increased frequency of blood group O and of the non-secretor status
- C. Increased incidence of HLA-B5 antigen
- D. An increase in serum pepsinogen II level
- E. H. Pylori has no role

19- H. Pylori is usually not associated with

- A. Zollinger-Ellison syndrome
- B. Antral gastritis
- C. Non-ulcer dyspepsia
- D. Gastric lymphoma
- E. Peptic ulcer

20- Which of the following does not give rise to hematemesis?

- A. Carcinoma of the stomach
- B. Duodenal diverticula
- C. Mallory-Weiss syndrome
- D. Somatostatinoma
- E. Peptic ulcer

21- The weight of normal daily stool of healthy adult is

- A. 100-200 g
- B. 300-400 g
- C. 500-600 g
- D. 700-800 g
- E. up to 240g

22- All of the following are methods for detection of *H. pylori* **EXCEPT**

- A. histology
- B. endoscopic view
- C. polymerase chain reaction
- D. rapid urease test
- E. Serum ELIZA test

23- All are absorbed maximally in the upper small intestine **EXCEPT**

- A. Folate
- B. Ca^{++}
- C. Vitamin B12
- D. Fe^{++}
- E. K^{+}

24- Gastrin is predominantly secreted from

- A. Antral mucosa
- B. Fundus of the stomach
- C. 2nd part of the duodenum
- D. Jejunum
- E. ileum

25- Late dumping syndrome may be manifested by all **EXCEPT**

- A. Diaphoresis
- B. Dizziness
- C. Postural hypertension
- D. Confusion
- E. Bradycardia

26- The most common gastrointestinal disorder in community is

- A. Diverticulitis
- B. Duodenal ulcer
- C. Reflux esophagitis
- D. Irritable bowel syndrome
- E. peptic ulcer

27- Incidence of stress ulcer in acutely traumatized patient is

- A. 30-40%
- B. 50-60%
- C. 70-80%
- D. 90-100%
- E. 10%

28- Which of the following surgical procedures in peptic ulcer most commonly gives rise to recurrent ulceration?

- A. Gastroenterostomy
- B. Vagotomy with pyloroplasty
- C. Three-quarter gastric resection
- D. Vagotomy with gastroenterostomy
- E. Highly selective vagotomy

29- Commonest cause of antral gastritis is

- A. Alcohol
- B. *H. Pylori* infection
- C. Pernicious anaemia
- D. Herpes virus infection
- E. NSAID

30- All of the following are true in respect Zollinger-Ellison syndrome **EXCEPT**

- A. Pancreatic gastrinomas are most common in the head of the pancreas
- B. Solitary primary tumors are very common
- C. Duodenum, hilum of the spleen and rarely the stomach may have gastrinomas
- D. Majority of tumors are biologically malignant
- E. A common cause of recurrent peptic ulcer

31- In gastroparesis, the following drugs are helpful **EXCEPT**

- A. Cisapride
- B. Tetracycline
- C. Metoclopramide
- D. Domperidone
- E. Erythromycin

32- Malabsorption may produce all of the following **EXCEPT**

- A. Cheilosis
- B. Achlorhydria
- C. Peripheral neuropathy
- D. Loss of libido
- E. gall stones

33- A normal faecal fat is defined as

- A. < 6 g for 24 hrs
- B. < 9 g for 24 hrs
- C. < 12 g for 24 hrs
- D. < 15 g 24 hrs
- E. < 17g 24 h

34- Which cardiovascular disorder is not associated with steatorrhea

- A. Amitriptyline
- B. Congestive cardiac failure
- C. Left atrial myxoma
- D. Mesenteric vascular insufficiency
- E. Pericardial effusion

35- All of the following may be associated with diarrhea EXCEPT

- A. amitriptyline
- B. colchicine
- C. sorbitol
- D. theophylline
- E. Amoxicillin

36- Steatorrhea accompanying diabetes mellitus may be due to all EXCEPT

- A. Exocrine pancreatic insufficiency
- B. Hypergastrinemia
- C. Coexistent celiac sprue
- D. Abnormal bacterial proliferation in proximal intestine
- E. Abnormal motility

37- The basic defect in celiac sprue lies in

- A. Protein metabolism
- B. Fat metabolism
- C. Carbohydrate metabolism
- D. Vitamins and minerals absorption
- E. Mucosal defect

38- Lactose intolerance with lactase deficiency may be present in all EXCEPT

- A. Crohn's disease
- B. Giardiasis
- C. Cystic fibrosis
- D. Amoebiasis
- E. Celiac disease

39- The most specific treatment in celiac sprue is

- A. Gluten-free diet
- B. Antibiotics
- C. Corticosteroids
- D. Folic acid
- E. Vitamin B12

40- Hepatic amoebiasis is associated with all EXCEPT

- A. May lead to development of amoebic liver abscess
- B. Right lower intercostals tenderness
- C. Abscess commonly affects the right lobe
- D. Quinolones are the treatment of choice
- E. Fever

41- Treatment of choice in correcting anaemia of 'blind loop syndrome' is

- A. Iron
- B. Broad-spectrum antibiotics
- C. Vitamin B12
- D. Folic acid
- E. Probiotic

42- The major site of bile salt absorption is

- A. Stomach
- B. Duodenum
- C. Proximal small intestine
- D. Distal small intestine
- E. Colon

43- All are recognized complications of inflammatory bowel disease EXCEPT

- A. gallstone formation
- B. pyoderma gangrenosum
- C. aphthous stomatitis
- D. erythema marginatum
- E. hematochezia

44- Regarding ulcerative colitis which is TRUE

- A. Segmental involvement is common
- B. Granuloma and fistula formation are characteristic
- C. Crypt abscesses are typical
- D. Malignancy never follows even in long-standing disease
- E. Bleeding is rare

45- Which segment of the GI tract is most susceptible to volvulus

- A. Caecum
- B. Sigmoid colon
- C. Small intestine
- D. Stomach
- E. Rectum

46- Crohn's disease may be complicated by all EXCEPT

- A. Hydroureter
- B. Clubbing
- C. Amyloidosis
- D. Chronic cholecystitis
- E. Arthritis

47- "String sign" in Crohn's disease is due to

- A. Fistula
- B. Spasm
- C. Pseudopolyps
- D. Small ulceration
- E. Stricture

48- Regarding Meckel's diverticulum which one is FALSE

- A. Present in 2% population
- B. Usually 5 cm long
- C. Present within 100 cm of the ileocaecal valve
- D. May contain esophageal or rectal mucosa
- E. Common cause of peptic ulcer disease

49- Peritonitis may be complicated by all **EXCEPT**

- A. Renal failure
- B. Acute lung injury
- C. Pelvic abscess
- D. Hemorrhagic pancreatitis
- E. Ascites

50- Which is true in respect to irritable bowel syndrome

- A. Most common GI disorder in practice
- B. Commonly affects males
- C. Easily treatable
- D. Nocturnal diarrhea is common
- E. Precancerous condition

51- Commonest complaint by a patient in carcinoma of the rectum is

- A. Constipation
- B. Pain abdomen
- C. Hematochezia
- D. Anal pain
- E. Anal fistula

52- All of the following are true in irritable bowel syndrome **EXCEPT**

- A. Usually have 3 clinical components: spastic, diarrheal and both
- B. Altered intestinal motility and increased visceral perception are the main pathophysiologic abnormalities
- C. Rectal ampulla is empty but tender sigmoid is full of faeces
- D. Sigmoidoscopy shows multiple small discrete ulcers often covered with slough
- E. Symptoms often change over time

53- Crohn's disease may produce all of the following **EXCEPT**

- A. Vesicovaginal fistula
- B. Rectovesical fistula
- C. Perianal fistula
- D. Jejunocolic fistula
- E. Enterocutaneous fistula

54- Commonest extraintestinal complication of ulcerative colitis is

- A. Sclerosing cholangitis
- B. Arthritis
- C. Pyoderma gangrenosum
- D. Uveitis
- E. Sjogren's syndrome

55- Symptoms in carcinoma of the left colon include all except

- A. Cramps in the abdomen
- B. Melena
- C. Low back pain
- D. Alteration of bowel habit
- E. steatorrhea

56- Which is true regarding irritable bowel syndrome

- A. Pain abdomen usually lasts for 1/2 hour
- B. Temporary relief of pain by passage of flatus or stool
- C. Nocturnal pain abdomen is frequent complaint
- D. Periodicity is common
- E. Positive occult blood in stools is common

57- Crohn's disease is caused by

- A. Nutritional deficiency
- B. Toxin elaborated by infectious microorganisms
- C. Autoimmunity
- D. Not known
- E. NSAID

58- Ulcerative colitis involves the rectal mucosa in

- A. 30-40%
- B. 50-60%
- C. 70-80%
- D. 90-100%
- E. less than 10%

59- Which one is false regarding irritable bowel syndrome

- A. sense of complete evacuation
- B. abdominal distension
- C. colicky pain abdomen
- D. mucous diarrhea or pencil-like pasty stool
- E. coexisting minor psychiatric illness

60- All of the following are true regarding diverticulitis **EXCEPT**

- A. Males are affected more than females
- B. Right side of colon is less affected than left
- C. Perforation is a serious complication
- D. Massive rectal bleeding is very common
- E. Diagnosed by colonoscopy

61- All of the following are true regarding right-sided colonic carcinoma **EXCEPT**

- A. Cachexia
- B. Anaemia
- C. Pain abdomen
- D. Alteration of bowel habit
- E. Anorexia

62- Which of the following may develop into intestinal lymphoma

- A. Coeliac disease
- B. Ulcerative colitis
- C. Eosinophilic enteritis
- D. Intestinal lymphangiectasia
- E. Tropical sprue

- 63- Melanosis coli indicates
- Anthraquinone laxative abuse
 - Hypereosinophilic enteritis
 - Crohn's disease
 - Melanoma affecting colon
 - Excess melatonin secretion
- 64- Hour-glass stomach is usually produced
- Lymphoma
 - Syphilis
 - Developmental Anomaly
 - Gastric Ulcer
 - Linitis Plastica
- 65- Bacillary dysentery can be differentiated from ulcerative colitis by:
- Barium Enema
 - Stool Culture
 - Stool Smear
 - Sigmoidoscopy
 - Rectal Snip
- 66- Commonest site of carcinoma of the stomach is
- Prepyloric
 - Lesser Curvature
 - Greater Curvature
 - Body Of The Stomach
 - Fundus
- 67- Which one of the following is not an ocular complication of ulcerative colitis
- uveitis
 - cataract
 - scleromalacia perforans
 - episcleritis
 - Iritis
- 68- Commonest sites of carcinoid tumour is
- Stomach
 - Ileum
 - Appendix
 - Colon
 - Duodenum
- 69- Desire for defecation is initiated by
- Distention of the sigmoid colon
 - Contraction of the rectum
 - Distention of the rectum
 - Contraction of the internal anal sphincter
 - Relaxation of the external anal sphincter

- 70- Presence of diverticulosis is most commonly seen in
- Transverse Colon
 - Sigmoid Colon
 - Descending Colon
 - Caecum
 - Duodenum
- 71- Diabetic diarrhea may be encountered in the presence of
- Nephropathy
 - Neuropathy
 - Retinopathy
 - Macroangiopathy
 - Acidosis
- 72- which is not effective to eradicate H. Pylori
- Clarithromycin
 - Pantoprazole
 - Tinidazole
 - Cefixime
 - Metronidazole
- 73- Most reliable method of measuring steatorrhea is
- Schilling test
 - D-Xylose absorption test
 - Faecal fat estimation
 - Small intestinal mucosal biopsy
 - Enteroscopy
- 74- Carcinoma of the large intestine is mostly found in
- Caecum
 - Sigmoid Colon
 - Transverse Colon
 - Ascending Colon
 - Descending Colon
- 75- gluten- free diet is beneficial in
- Celiac Disease
 - Atopic Eczema
 - Psoriasis
 - Pemphigus
 - Chronic Gastritis
- 76- mucosal immunity is mainly due to
- IgG
 - IgA
 - IgM
 - IgD
 - Ig A

77- anti-Saccharomyces cerevisiae antibody (ASCA) is classically present in

- A. Primary Sclerosing Cholangitis
- B. Crescentic Glomerulonephritis
- C. Wegener's Granulomatosis
- D. Ulcerative Colitis
- E. Crohn's Disease

78- Hyper defecation is characteristic of all EXCEPT

- A. Irritable bowel syndrome
- B. Diverticulitis
- C. Hyperthyroidism
- D. Proctitis
- E. Hypothyroidism

79- Constipation may develop from all EXCEPT

- A. Clonidine
- B. Cholestyramine
- C. Colchicine
- D. Calcium-channel blocker
- E. Opiates

80- Which of the following does not produce secretory diarrhea

- A. Hyperparathyroidism
- B. Medullary carcinoma of the thyroid gland
- C. Carcinoid syndrome
- D. Zollinger-Ellison syndrome
- E. Pancreatitis

81- Classical triad in carcinoid syndrome is

- A. dyspnea, flushing, valvular heart disease
- B. flushing, diarrhea, valvular heart disease
- C. pruritus, wheezing, diarrhea
- D. telangiectasia, flushing, diarrhea
- E. Purpura, diarrhea, and bronchospasm

82- Which is not included in the classical triad of chronic pancreatitis

- A. diabetes mellitus
- B. abdominal pain
- C. pancreatic calcification
- D. steatorrhea
- E. Cullen's sign

83- Which of the pancreatic islet cells synthesize glucagon

- A. Alpha
- B. Beta
- C. Non-Beta
- D. Delta
- E. Gamma

84- Acute pancreatitis may eventually lead to all the following EXCEPT

- A. Acute Lung Injury
- B. Fulminant Hepatocellular Failure
- C. Disseminated Intravascular Coagulation
- D. Renal Failure
- E. ARDS

85- All are recognized complications of acute pancreatitis EXCEPT

- A. Pancreatic Phlegmon
- B. Pancreatic Pseudocyst
- C. Pancreatic Ascites
- D. Pancreatic Malignancy
- E. Pancreatic Calcification

86- Acute pancreatitis is not associated with

- A. Hyperparathyroidism
- B. Biliary Tract Disease
- C. Pancreatic Carcinoma
- D. Pancreatic Islet Cell Tumour
- E. Hypercalcemia

87- Which clotting factor retains its activity in hepatocellular disorder

- A. II
- B. VIII
- C. IX
- D. VII
- E. X

88- Venous prominence present in the upper abdomen with direction of flow towards pelvis suggests

- A. Inferior vena caval obstruction
- B. Portal hypertension
- C. Superior vena caval obstruction
- D. Hepatic vein thrombosis
- E. Splenic vein thrombosis

89- Serum alkaline phosphatase level may be increased in all EXCEPT

- A. Cholestasis
- B. Paget's disease
- C. Metastasis in liver
- D. Hypervitaminosis D
- E. Cholangitis

90- A patient is having isolated elevation of serum alkaline phosphatase. The next test to be performed is

- A. USG of liver
- B. Glutamyl transpeptidase (GGT) estimation
- C. Protein electrophoresis
- D. Bone scan
- E. Abdominal sonar

91- The major immunoglobulin in primary biliary cirrhosis is

- A. IgM
- B. IgA
- C. IgG
- D. IgD
- E. IgE

92- Which one of the following is false regarding type B hepatitis serology?

- A. Persistence of HBsAg >6 month implies carrier state
- B. HBcAg implies high infectivity
- C. Anti - HBs appears to reflect immunity
- D. IgG anti HBc acute hepatitis B virus infection
- E. Anti HBcAb is important in diagnosing mutant forms

93- Pruritus associated with cholestasis is mostly seen

- A. On the palm and soles
- B. At daytime
- C. After a cold bath
- D. In males
- E. Blacks

94- Which of the following is not associated with leukocytosis?

- A. Toxic hepatitis
- B. Acute viral hepatitis
- C. Portal pyemia
- D. Amoebic liver abscess
- E. Fulminant hepatitis

95- Vitamin k absorption is dependent on

- A. HCl
- B. Bile salts
- C. Bilirubin
- D. Succus entericus
- E. Pepsinogen

96- Bedside diagnosis of obstructive jaundice includes all EXCEPT

- A. Generalized pruritus
- B. Palpable gall bladder
- C. Dark- colored stool
- D. Xanthelasmas
- E. Itching marks

97- Which of the following drugs is not associated with cholestasis

- A. Erythromycin stearate
- B. Chlorpropamide
- C. Chlorpromazine
- D. Methyl testosterone
- E. Estrogen

98- Which is not true so far as definition of cirrhosis of liver is concerned

- A. Fatty infiltration
- B. Necrosis
- C. Fibrosis
- D. Regeneration
- E. Diffuse process

99- Spider naevi

- A. Are pathognomic of portal hypertension
- B. May be seen in some healthy people
- C. Often seen in first trimester of pregnancy
- D. Correlates with the amount of urinary oestradiol excretion
- E. Are seen on the skin in distribution of the IVC

100- Chronic active hepatitis may have all the following feature EXCEPT

- A. Amenorrhoea
- B. Arthralgia
- C. Jaundice
- D. Hematemesis
- E. Fatigue

101- Commonest microorganism responsible for cholangitis

- A. E.coli
- B. Klebsiella pneumonia
- C. hemangioendothelioma
- D. sarcoma
- E. staphylococcus aureus

102- In complete biliary obstruction , urinary urobilinogen is

- A. Decreased
- B. Elevated
- C. Remains normal
- D. Episodic increase and decrease
- E. Markedly elevated

103- All of the following are features of hepatocellular failure EXCEPT

- A. Feter hepaticus
- B. Ascites
- C. Flapping tremor
- D. Hematemesis
- E. Lower limb edema

104- Serum of patient contains only anti-HBs Ab, he is

- A. Acutely infected by type B virus
- B. Suffering from chronic hepatitis B virus infection
- C. Low level of HBsAg carrier
- D. Vaccinated
- E. Highly infective

105- Chronicity in hepatitis c virus infection is

- A. 10%
- B. 30%
- C. 50%
- D. 80%
- E. 100%

106- All of the following produces deep jaundice except

- A. G6PD deficiency
- B. Recurrent cholestasis of pregnancy
- C. Carcinoma of the head of pancreas
- D. Sclerosing cholangitis
- E. Primary biliary cirrhosis

107- Enlarged tender liver is found in all except

- A. Congestive cardiac failure
- B. Amoebic liver abscess
- C. Large hepatoma.
- D. Wilson s disease
- E. Acute hepatitis

108- Secondary carcinoma of liver should not have

- A. Malignant ascites
- B. Splenomegaly
- C. Jaundice
- D. Cachexia
- E. Portal vein thrombosis

109- Commonest cause of portal hypertension is

- A. Acute viral hepatitis
- B. Chronic active hepatitis
- C. Cirrhosis of liver
- D. Carcinoma of liver
- E. Steatohepatitis

110- Rapid diminution in the size of liver is seen in

- A. Cholangio - hepatitis
- B. Fulminant hepatic failure
- C. Carcinoma of liver
- D. Acute alcoholic hepatitis
- E. Steatosis

111- The Kayser-Fleischer ring is

- A. Broader laterally and medially
- B. The inferior pole of cornea is first affected
- C. Copper deposition in descemet's membrane
- D. Hampers vision
- E. Causes double vision

112- Definitive test for diagnosis of hemochromatosis is

- A. Plasma iron > 300 mg / dl
- B. Liver biopsy
- C. TIBC < 200 mg / dl
- D. Hepatic iron index > 1.5
- E. Urinary iron

113- Superficial venous flow in portal hypertension is

- A. Away from the umbilicus
- B. Below upwards
- C. Towards umbilicus
- D. Above downwards
- E. Lateral to medial

114- Which is false regarding hemochromatosis

- A. Pancreatic iron deposition lead to diabetes
- B. Most common cardiac manifestation is congestive heart failure
- C. Melanin and iron deposition give rise to bronzing of skin
- D. Hypogonadism results from iron deposition in testes
- E. May be secondary or hereditary

115- Commonest cause of post - transfusion hepatitis is

- A. Hepatitis B
- B. Hepatitis C
- C. Hepatitis D
- D. Hepatitis
- E. Delta hepatitis

116- Commonest hepatic lesion in hemochromatosis is

- A. Fatty liver
- B. Macronodular cirrhosis
- C. Micronodular cirrhosis
- D. Haemosiderosis
- E. Hepatic fibrosis

117- All are characteristic features of Wilson's disease **EXCEPT**

- A. Chorea
- B. Sensory loss
- C. Grimacing
- D. Slurred speech
- E. Winging upper limb movements

118- Absolute contraindication for liver biopsy is

- A. Cirrhosis of liver
- B. Cholestasis
- C. Hemangioma of liver
- D. Amoebic liver abscess
- E. Schistosomiasis

- 119- Which one of the following is false regarding primary biliary cirrhosis
- Female preponderance
 - Starts with pruritus
 - Moderate to severe jaundice
 - Clubbing
 - No intrahepatic biliary radical dilatation
- 120- All of the following may develop into chronic active hepatitis **EXCEPT**
- Methyldopa
 - Captopril
 - Isoniazid
 - Oxyphenisatin
 - Carbapenem
- 121- Congestive gastropathy in portal hypertension is treated by
- Terlipressin
 - Somatostatin
 - Propranolol
 - Nitroglycerin
 - Midodrine
- 122- Commonest cause of jaundice in pregnancy is
- Toxemia of pregnancy
 - Acute fatty liver of pregnancy
 - Acute viral hepatitis
 - Use of hepatotoxic drugs
 - Portal pyemia
- 123- Commonest cause of hepatoma is
- $\alpha 1$ - antitrypsin deficiency
 - Hemochromatosis
 - Alcohol
 - Cirrhosis of liver
 - Steatohepatitis
- 124- Tumour of liver found predominantly in females is
- Adenoma
 - Hepatocellular carcinoma
 - Angiosarcoma
 - Hepatoblastoma
 - Cholangiocarcinoma
- 125- Commonest organism causing pyogenic liver abscess is
- Anaerobes
 - Staphylococci
 - Streptococcus faecalis
 - E. coli
 - MRSA

- 126- In HBV infection, which serological maker is present in the "window period" as an evidence of recent HBV infection?
- HB eAg
 - IgG anti- HBc
 - IgM anti - HBc
 - HBV DNA
 - Anti HBsAg
- 127- Regarding non-alcoholic steato-hepatosis (NASH), all are true **EXCEPT**
- Occasionally progresses to cirrhosis and liver failure
 - Typically occurs in overweight, diabetic, hyperlipidemic subjects
 - Jejunioileal by-pass may be aetiology
 - Glucocorticoid helps cure
 - May be caused by certain drugs
- 128- Acute pancreatitis is caused by all **EXCEPT**
- Hypertriglyceridemia
 - Alcohol
 - Hypocalcaemia
 - Blunt trauma
 - Iatrogenic (ercp)
- 129- In acute infection with HBV, first thing to appear or rise in blood is
- HBsAg
 - Anti-HBs
 - GPT
 - Bilirubin
 - HBeAg
- 130- Continued infectivity in HBV infection is diagnosed by
- IgM Anti-HBc
 - HBsAg
 - HBV DNA
 - Anti-HBs
 - HBeAg
- 131- Which vitamin deficiency occurs in obstructive jaundice
- Folic acid
 - Vitamin a
 - Vitamin c
 - Vitamin b 12
 - Vitamin k
- 132- Morphine is contraindicated in
- Acute myocardial infarction
 - Terminal cancer pain
 - Biliary colic
 - Acute left ventricular failure
 - Acute pancreatitis

133- Pregnancy predisposes to all **EXCEPT**

- A. Acute hepatic failure
- B. Chronic hepatitis
- C. Steatosis
- D. Cholestasis
- E. Sclerosing cholangitis

134- All are 'medical causes of acute abdomen' **EXCEPT**

- A. Apical pneumonia
- B. Sickle cell anaemia
- C. Acute myocardial infarction
- D. Lead poisoning
- E. Diabetic ketoacidosis

Answer Key:

- | | | | |
|-------|-------|--------|--------|
| 1. A | 41. B | 81. B | 121. C |
| 2. C | 42. D | 82. B | 122. C |
| 3. D | 43. D | 83. A | 123. D |
| 4. A | 44. C | 84. B | 124. A |
| 5. C | 45. B | 85. D | 125. D |
| 6. A | 46. D | 86. D | 126. C |
| 7. A | 47. B | 87. B | 127. D |
| 8. C | 48. D | 88. C | 128. C |
| 9. D | 49. D | 89. D | 129. A |
| 10. B | 50. A | 90. B | 130. C |
| 11. B | 51. C | 91. A | 131. B |
| 12. A | 52. A | 92. D | 132. C |
| 13. E | 53. A | 93. A | 133. B |
| 14. C | 54. B | 94. B | 134. A |
| 15. D | 55. B | 95. B | |
| 16. C | 56. B | 96. C | |
| 17. A | 57. D | 97. A | |
| 18. D | 58. D | 98. A | |
| 19. A | 59. A | 99. B | |
| 20. D | 60. D | 100. D | |
| 21. A | 61. D | 101. A | |
| 22. B | 62. A | 102. A | |
| 23. C | 63. A | 103. D | |
| 24. A | 64. D | 104. D | |
| 25. C | 65. B | 105. D | |
| 26. D | 66. A | 106. A | |
| 27. D | 67. B | 107. D | |
| 28. A | 68. C | 108. B | |
| 29. B | 69. C | 109. C | |
| 30. B | 70. B | 110. B | |
| 31. B | 71. B | 111. C | |
| 32. B | 72. D | 112. B | |
| 33. A | 73. C | 113. A | |
| 34. C | 74. B | 114. D | |
| 35. A | 75. A | 115. B | |
| 36. B | 76. B | 116. B | |
| 37. A | 77. D | 117. B | |
| 38. D | 78. B | 118. C | |
| 39. A | 79. C | 119. C | |
| 40. D | 80. A | 120. B | |

ENDOCRINOLOGY

Multiple Choice Questions (MCQs)

1. A 60-year-old man comes for check up. Physical examination and medical history are unremarkable. A blood chemistry panel is normal except for a serum calcium level of 11 mg/dL when corrected for serum albumin. The measurement is repeated two times, giving values of 10.5 mg/dL and 11.2 mg/dL, respectively. Serum phosphorus is 2.5 mg/dL, and alkaline phosphatase is 50 U/L. Immunoradiometric assay (IRMA) reveals higher than normal serum levels of parathyroid hormone. Urine calcium excretion is within normal limits. The patient denies previous renal colic or urinary tract infections. **Which of the following is the most appropriate next step in management?**
- Bone x-ray films
 - Extensive cancer screening
 - Generous fluid intake
 - Surgical exploration of the neck
 - Treatment with bisphosphonates (e.g., alendronate)

The correct answer is C. Hyperparathyroidism is one of the most frequent endocrinologic conditions, found in 1 in 1000 adults. In most cases, hyperparathyroidism is asymptomatic, manifesting only with hypercalcemia often discovered incidentally in the course of routine laboratory investigations conducted for other reasons. The most common cause is a parathyroid adenoma. Calcium levels should be corrected for albuminemia, since most of the calcium is bound to serum albumin. If hypercalcemia is the only clinical sign, without associated complications such as renal stones, bone disease, or cataracts, abundant fluid intake is the only measure recommended to prevent formation of calcium stones in the urinary system. Surgical exploration of the neck (**choice D**) is aimed at finding the source of increased PTH production, which is usually a parathyroid adenoma. Removal of the adenoma is recommended when patients have symptomatic hyperparathyroidism, with recurrent renal stones or bone disease. Indications for surgical treatment in asymptomatic patients include very high calcium levels, high urinary excretion of calcium, extreme bone loss, or difficulty in medical follow-up.

2. A 31-year-old man presents to the clinic for an annual physical examination. He has a 19-year history of type 1 - diabetes, requiring 10 units NPH insulin each morning and 8 units NPH in the evening, with frequent blood glucose checks and regular insulin dosing throughout the day. He does not keep a log of his blood glucose values. A urine dipstick test shows 2+ albumin. His hemoglobin A1 (HbA1) is 7.9%. **Which of the following is the most appropriate next step in management to prevent morbidity?**

- Add a standing regular insulin dose at lunchtime
- Begin ACE inhibitor therapy
- Discuss options for using an insulin pump
- Increase his morning NPH insulin dose
- Send a 24-hour urine collection specimen for total protein

The correct answer is B. The concepts underlying this question are those of diabetes mellitus and the prevention of its complications. Many clinical trials have shown the beneficial effects of ACE inhibitors on preventing nephropathy and slowing the progression of established nephropathy in diabetics. This patient has microalbuminuria as shown by his urine dipstick, suggesting developing renal disease. It is the standard of care that all diabetics be given an ACE inhibitor if they are able to tolerate its blood pressure effects.

3. A 40-year-old woman presents with increased nervousness for the past 3 months. She reports insomnia, frequent palpitations without an identifiable cause, and weakness. She has no significant past medical history and takes no medications. Vital signs are remarkable for a blood pressure of 150/60 mm Hg and a pulse of 135/min. She appears anxious, and despite being in the middle of winter, is dressed in a T-shirt. Physical examination reveals proptosis and eyelid retraction, moist skin, mild hand tremor, and a palpable diffuse goiter. **Which of the following is the most likely diagnosis?**

- Euthyroid sick syndrome
- Follicular carcinoma of the thyroid
- Graves disease
- Hashimoto thyroiditis
- Subacute thyroiditis

The correct answer is C. This patient is exhibiting the classic presentation of hyperthyroidism. Other signs and symptoms that may be seen include atrial fibrillation, nervousness, increased appetite, weight loss, frequent bowel movements, diplopia, conjunctival injection, and pretibial myxedema. The most common cause of hyperthyroidism is Graves's disease (diffuse toxic goiter); in fact, infiltrative ophthalmopathy (as well as pretibial myxedema) is a specific autoimmune manifestation of Grave's disease. The disease has an autoimmune basis, with antibodies directed against the TSH receptors, causing continuous thyroid gland stimulation. Euthyroid sick syndrome (**choice A**) causes asymptomatic thyroid hormone alterations, usually in patients with serious systemic disease.

4. One week following an uncomplicated delivery, a 27 year-old woman presents with polyuria and excessive thirst. Her pregnancy was normal, but she reports that she began to feel an unusual craving for ice water in the last month of gestation. She is forced to get up at night several times to void and drinks large amounts of water. Her blood pressure is 120/80 mm Hg. Serum electrolytes are within normal limits. A 24-hour urine yields the following results:

Total volume 10 L
Specific gravity <1.006
Glucose Absent
Protein <150 mg

Which of the following is the most appropriate next step in management?

- A. Advise the patient to reduce water intake
- B. Order MRI studies of the pituitary-hypothalamic region
- C. Perform vasopressin challenge test
- D. Refer for psychiatric evaluation of compulsive water drinking
- E. Refer to nephrologist for evaluation of nephrogenic diabetes insipidus

The correct answer is C. The clinical picture is highly suggestive of diabetes insipidus, a disorder due to deficiency of antidiuretic hormone (ADH) secretion from the posterior pituitary gland. Polydipsia is a consequence of polyuria (not an effect) because of abundant diuresis secondary to ADH deficiency. The vasopressin challenge test is given by administering desmopressin (a synthetic form) by the nasal route, and monitoring the urine output 12 hours before and 12 hours after administration. If the symptomatology is due to central diabetes insipidus, the patient will experience an immediate reduction in thirst and urine output. Besides the high likelihood of noncompliance, advising the patient to reduce water intake (**choice A**) would expose her to severe dehydration and hypernatremia due to loss of water and resultant hemoconcentration.

MRI studies of the pituitary-hypothalamic region (**choice B**) are performed to search for mass lesions that may be the underlying cause of central diabetes insipidus. These investigations should be performed after the diagnosis has received confirmation by a vasopressin challenge test.

Compulsive water drinking may require psychiatric evaluation (**choice D**), and may mimic diabetes insipidus, but this possibility should be undertaken once diabetes insipidus has been ruled out. In this particular case, the close temporal association with pregnancy and delivery makes the diagnosis of diabetes insipidus more likely. Evaluation of nephrogenic diabetes insipidus (**choice E**) is the next appropriate step if the patient does not respond to vasopressin challenge test. Nephrogenic diabetes insipidus, in fact, is due to resistance of renal tubules to the action of vasopressin. A hereditary X-linked form is known, usually associated with hyperuricemia. Acquired forms are associated with a variety of conditions, e.g., pyelonephritis, multiple myeloma, and chronic hypercalcemia.

5. A 45-year-old man comes to the physician because his "face and voice have changed." The patient came to this realization after meeting a nephew, who had not seen him for 2 years and could hardly recognize him. He also reports that he has had persistent joint pains in the past 6 months. His blood pressure is 140/90 mm Hg, but he says he has never had values over 120/80 mm Hg on previous examinations. Physical examination reveals coarse facial features, a large tongue, and thick fingers. His handshake is moist and doughy, and his voice deep. Which of the following is the most appropriate next step in diagnosis?

- A. GH levels after glucose suppression test
- B. Measurement of baseline GH levels
- C. Measurement of TSH levels
- D. MRI of the head
- E. X-Ray Hands and Skull

The correct answer is A. The clinical presentation is consistent with acromegaly, due to overproduction of growth hormone (GH). This syndrome manifests when excessive production of GH occurs in adulthood after closure of the epiphyseal growth plates. Consequently, hypertrophy of acral bones and skeletal muscle results, leading to enlargement of the tongue, hands, feet, and craniofacial skeleton. Hypertrophy of pharyngeal and laryngeal tissues makes the voice deeper. Changes in facial morphology and voice are often not recognized by the patient or friends and relatives, since they develop slowly, but are commonly recognized by people who have not seen the patient for many years. Often, the patient realizes that his hat, ring, or shoes do not fit any more. Secondary diabetes mellitus, arthritis, hyperhidrosis (with moist and doughy handshake), cardiomegaly, and hypertension are frequent manifestations. GH-producing pituitary adenomas are the usual cause, the diagnosis, once suspected, is confirmed by a glucose suppression test: serum levels of GH are assessed in a blood sample drawn after an overnight fast and following a challenge with 100 g oral glucose. A GH concentration higher than 2 ng/mL in men or 5 ng/mL in women is considered positive.

MRI (**choice D**) of the head is used to reveal a pituitary adenoma following a positive GH-suppression glucose test. MRI is the method of choice for pituitary lesions. Measurement of baseline growth hormone levels (**choice B**) is not adequate. Some patients may have normal baseline GH levels, but exercise, stress, hepatic or renal diseases, and a number of drugs may produce abnormally high levels.

6. A 61-year-old woman presents for a check-up. She has a history of diabetes and hypertension and cigarette smoking. Laboratory studies show: Creatinine 0.9 mg/dL, Calcium 11.5 mg/dL and Albumin 3.4g/dL. Which of the following is the most likely diagnosis?

- A. Excess vitamin D intake
- B. Occult malignancy
- C. Paget disease
- D. PTH over secretion
- E. Sarcoidosis

The correct answer is D. The most common cause of asymptomatic hypercalcemia is

primary hyperparathyroidism. In older women, 85% of cases are due to adenoma of a single gland, 15% are caused by hyperplasia of all four parathyroid glands, and about 1% is associated with carcinoma. Most patients have asymptomatic hypercalcemia that is found incidentally during a routine laboratory examination.

7. A 22-year-old woman with type 1 diabetes presents with anorexia, nausea, vomiting, and abdominal pain. She is recovering from pneumonia and has had much difficulty regulating her blood sugars lately. On arrival to the emergency department, her blood glucose is 760 mg/dL, sodium is 125 mEq/L, potassium is 3.0 mEq/L, bicarbonate is 12 mEq/L, chloride is 92 mEq/L, and her blood is positive for ketones by acetone screening. Which of the following is the most appropriate initial step in management?

- A. Broad coverage antibiotic therapy
- B. IV glucose and insulin
- C. IV hypertonic saline
- D. IV potassium
- E. IV saline

The correct answer is E. The management of diabetic ketoacidosis (DKA) requires a basic understanding of three concepts: the patient has some underlying trigger for the DKA, the patient is very volume depleted, and the patient has severe electrolyte abnormalities. The management therefore focuses on these issues. This patient has an anion gap acidosis (gap >20) and elevated blood glucose. The first step in the care of all DKA patients is prompt restoration of their volume status. This is the priority, as the ongoing diuresis from the elevated glucose will only worsen their acidosis. Administration of broad coverage antibiotic therapy (choice A) would be appropriate if the patient has an underlying infection. However, this intervention has no place in the acute management of DKA.

Administration of IV glucose and insulin (choice B) is appropriate once the blood glucose falls below 250 mg/dL. It is important at all times to have insulin on board for diabetic patients. Once the glucose falls below 250 mg/dL during therapy, glucose must be given with the insulin to prevent hypoglycemia and assist with clearance of the ketone bodies.

Hypertonic saline should not be administered (choice C), since this patient's corrected sodium is 133 mEq/L (any extra glucose in the sample of blood used to calculate serum electrolytes will decrease the measured serum sodium by 2.6 mEq/L per 100 mg/dL of glucose), which is acceptable.

Administration of IV potassium (choice D) will be needed as the patient's acidosis begins to correct and the serum potassium begins to decline. In DKA patients, total body potassium becomes depleted as a result of diuresis.

8. A 23 year-old woman has a 6-month history of amenorrhea and galactorrhea. Physical examination confirms that milk can be expressed from both breasts, but it is otherwise unremarkable. The pelvic examination is also unremarkable, showing no uterine enlargement or ovarian masses. Visual fields are normal. A pregnancy test is negative. Once the diagnosis is confirmed, which of the following is the most appropriate management?

- A. Bilateral mastectomy
- B. Bromocriptine
- C. Streptozocin
- D. Systemic chemotherapy
- E. Tamoxifen

The correct answer is B. Here the clinical diagnosis is prolactinoma, from a pituitary microadenoma (too small to produce visual field defects). The first line of treatment is bromocriptine. Pituitary surgery can be performed if needed.

9. A 29-year-old woman comes for a check-up. Palpation of the neck reveals a firm, 0.5-cm nodule in the right thyroid lobe. The remainder of the gland is normal. The physical examination is otherwise unremarkable. The patient denies any symptoms attributable to hyperthyroidism. The results of thyroxine and TSH immunoassays are within normal limits. Which of the following is the most appropriate next step in diagnosis?

- A. CT scan of the neck
- B. Excision
- C. Fine needle aspiration
- D. MRI scan of the neck
- E. Radioactive iodine scan

The correct answer is C. An isolated thyroid nodule is a frequent finding in asymptomatic adults, and most of such nodules are benign. Fine needle aspiration allows a diagnosis in most cases. The material aspirated with a needle is smeared on a slide and stained. In only 15% of cases is the aspirated material "non-diagnostic." Suspicious cases are followed with repeated fine needle aspiration. Malignant nodules are usually large (>3 cm) and/or fixed to the surrounding parenchyma. Papillary carcinoma is the most common malignant thyroid neoplasm. Ultrasonography may also be of value in distinguishing solid from cystic nodules and is preferred to MRI scan (choice D) or CT scans (choice A) because of its high sensitivity and lower cost. However, CT and MRI are valuable in defining the extent of malignant tumor, once the diagnosis is made.

Radioactive iodine scan (choice E) is needed when a solitary thyroid nodule is associated with symptoms of thyrotoxicosis. Radioactive iodine scan helps to distinguish a toxic adenoma from Graves disease, in which high uptake is seen in the whole gland.

Excision of a thyroid nodule (choice B) is performed if it proves to be malignant, or in case of a hot (i.e., hyperfunctioning) nodule causing thyrotoxicosis.

10. A 75 year-old woman is brought to ER after being found unconscious by a neighbor. The woman has a history of type 2 diabetes. Plasma glucose was 975 mg/dL. Which of the following additional findings would be most consistent with the patient's probable diagnosis?

- A. Blood urea nitrogen 5 mg/dL
- B. Plasma strongly positive for ketones
- C. Serum creatinine 0.3 mg/dL
- D. Serum osmolality 380 m Osmol/kg
- E. Serum sodium 132 mEq/L

The correct answer is D. This woman is in a nonketotic hyperglycemic hyperosmolar coma, a feared complication of type 2 diabetes mellitus that is associated with a 50% mortality rate. The basic problem is that when extreme hyperglycemia occurs, glucose spills into the urine and can cause profound dehydration, since the glucose acts as an osmotic diuretic. Features of this syndrome include CNS alterations, extreme hyperglycemia (typical values in the range of 1000 mg/dL), and dehydration. These features in turn lead to hyperosmolality (the correct choice in this case; normal values are less than about 290 m Osmol/kg), mild metabolic acidosis, no ketonemia to minimal hyperketonemia, and prerenal azotemia. Diabetic ketoacidosis, which is the other diagnosis that should be considered, is uncommon in type 2 diabetics and is associated with lower blood glucose levels than nonketotic hyperglycemic hyperosmolar coma.

11. Thirty-six hours after surgical removal of a large parathyroid adenoma, a 50-year-old man becomes irritable and develops a tingling sensation around his mouth and in his hands. Facial spasm can be easily triggered by tapping in front of the ear. Laboratory studies show: serum Albumin 4.0 g/dL, Bicarbonate 25 mEq/L, Calcium 7.1 mg/dL, Phosphorus 7.5 mg/dL, Magnesium 1.8 mEq/L, Arterial blood (room air): pH 7.40, PO₂ 90 mm Hg, and PCO₂ 42 mm Hg. Which of the following is the most likely cause of this condition?

- A. Atrophy of the remaining parathyroids
- B. Hungry bone syndrome
- C. Hyperventilation syndrome
- D. Magnesium deficiency
- E. Metastatic parathyroid carcinoma

The correct answer is A. Low calcium and high phosphorus levels, combined with the characteristic manifestations of hypocalcemia (muscle spasms and perioral paresthesias), are characteristic of hypoparathyroidism. This often occurs as a transient postoperative manifestation following removal of a large parathyroid adenoma, which had previously caused atrophy of the remaining normal glands. Hypocalcemia must be treated with IV calcium gluconate soon after surgery followed by oral calcium and vitamin D administration.

Hungry bone syndrome (choice B) develops days or weeks following resection of a parathyroid adenoma because of avid calcium uptake by a previously demineralized bone. However, since PTH returns to normal levels as the normal glands become functional again, hypocalcemia is not associated with hyperphosphatemia, as in this case.

Hungry bone syndrome is the main reason patients require calcium and vitamin D supplementation for months after surgery.

12. A 50-year-old woman is admitted for urinary tract infection, complicated by profound weakness, abdominal pain, vomiting, and diarrhea. Her temperature is 40.0°C, blood pressure is 90/60 mm Hg, pulse is 110/min, and respirations are 18/min. Examination reveals signs of dehydration and skin hyperpigmentation over the elbows and knees. Urinalysis shows pyuria. Laboratory studies show hyponatremia, hyperkalemia, and hypoglycemia. Complete blood count is remarkable for eosinophilia. While waiting for the results of urine and blood cultures, intravenous corticosteroids, broad-spectrum antibiotics, and volume replacement therapy is instituted. In addition to such treatment, which of the following is the most appropriate next step?

- A. Corticotropin stimulation test
- B. Cortisol level
- C. IV mineralocorticoid
- D. Oral corticosteroids
- E. Renal ultrasonography

The correct answer is B. This patient probably has acute adrenal insufficiency, or adrenal crisis. Measurement of serum cortisol will verify the likely diagnosis (cortisol levels would normally be increased following the stress of surgery). Adrenal insufficiency occurs in patients with latent Addison disease who have stress due to events such as surgery infections, or severe trauma. Other common situations that may precipitate an adrenal crisis include bilateral adrenalectomy, removal of a cortical adenoma that has suppressed the normal gland, and abrupt cessation of exogenous corticosteroid therapy. Withdrawal of corticosteroid treatment should be carried out by gradually tapering the doses. Acute adrenal insufficiency is characterized by signs and symptoms similar to Addison disease, but manifesting with dramatic severity. Indeed, this is a life-threatening condition requiring emergency administration of IV hydrocortisone (100-300 mg), lest the patient develop irreversible shock. Naturally, fluid infusion should be concomitantly administered, and treatment of the underlying cause (in this case, infection) carried out.

13. A 32-year-old woman complains of sudden onset of palpitations and fatigue. Two months ago, she began to lose weight despite an apparent increase in appetite. She also has insomnia and increasing anxiety. She is 168 cm tall and weighs 50 kg. Her temperature is 37.2°C, blood pressure is 140/65 mm Hg, and pulse is 120/min and irregular. Her lungs are clear to auscultation. An ECG reveals atrial fibrillation. Which of the following is the most appropriate next step in diagnosis?

- A. Chest x-ray
- B. Complete blood count
- C. Echocardiogram
- D. Neuropsychiatric referral
- E. TSH assay

The correct answer is E. The three most common causes of atrial fibrillation are myocardial ischemia, mitral valve disease, and hyperthyroidism. In some cases, atrial fibrillation may be the first manifestation of hyperthyroidism. In this case, atrial fibrillation is associated with additional signs and symptoms of exaggerated thyroid function, including loss of weight, increased appetite, insomnia, and anxiety. Measurement of the TSH level is an even more sensitive test for thyrotoxicosis. TSH secretion is suppressed, except in those very rare cases due to increased hypothalamic TRH secretion, or to an equally rare TSH-releasing pituitary tumor.

14. A 40-year-old obese woman consults a gynecologist because of chronic vaginal discharge. Gynecologic examination demonstrates cheesy, curd-like, white vaginal discharge. Culture of this material demonstrates *Candida albicans*. The patient's infection clears with oral tri conazole but recurs 1 month later. During the recurrence, she also develops candidiasis of the skin beneath her breasts and of her oral cavity. Which of the following screening blood biochemistry tests would be most appropriate at this point?

- A. Bicarbonate
- B. Calcium
- C. Glucose
- D. Iron
- E. Sodium

The correct answer is C. Recurrent candidiasis may simply indicate a resistant or poorly treated strain, but the severity of this patient's infection should raise the possibility of immunosuppression. Diabetes mellitus is a particularly likely candidate, since the combination of immunosuppression and glucose-rich secretions (the same process that spills glucose into urine will spill glucose into vaginal and other secretions) very much favors fungal infection. In some adult-onset diabetic patients, recurrent candidiasis is the presenting complaint. Hence, the appropriate choice of tests is to screen blood glucose.

15. A 25-year-old woman presents with lightheadedness and excessive thirst and urination. She states that she recently had a cold. She has a history of type 1 diabetes mellitus, for which she takes subcutaneous insulin. On physical examination, she appears anxious and has a supine blood pressure of 110/70 mm Hg and a pulse of 100/min, which change to 90/60 mm Hg and 140/min on sitting up. She is diaphoretic and breathing rapidly at 35 respirations/min. Her skin shows tenting, and her lungs are clear. Laboratory results show: Sodium 140 mEq/L, Potassium 6.8 mEq/L, Chloride 100 mEq/L, Bicarbonate 10 mEq/L, Glucose 600 mg/dl, Urinalysis: 3+ glucose and ketones. Arterial blood gases: pH 7.27, PCO₂ 23 mm Hg, and PO₂ 100 mmHg. Which of the following is the most appropriate step in management?

- A. Continuous infusion of isotonic fluid
- B. Continuous infusion of modified (NPH) insulin
- C. Continuous infusion of regular insulin
- D. Continuous infusion of regular insulin and isotonic fluid
- E. Subcutaneous injection of regular insulin every 4 hours

The correct answer is D. The patient is in diabetic ketoacidosis (DKA). The precipitant is probably the recent infection. The patient has become hyperglycemic, leading to an osmotic diuresis. The low insulin levels have induced a fasting state, leading to catabolism of fatty acids into ketones. She needs continuous short-acting insulin to reverse this process. Regular insulin is short-acting and can be administered via continuous intravenous infusion, with monitoring of the patient's blood glucose response. This patient is also dehydrated because of the osmotic diuresis; the dehydration is the cause of the observed orthostasis, therefore, fluid replacement with regular insulin infusion is the ideal treatment.

16. A 60-year-old woman presents to a physician complaining of a swelling in her neck. Her past medical history is significant for rheumatoid arthritis and Sjögren syndrome. Physical examination reveals a mildly nodular, firm, rubbery goiter. Total serum thyroxine (T4) is 10 mg/dL, and third-generation thyroid-stimulating hormone (TSH) 1.2 mIU/ml. Antithyroid peroxidase antibody titers are high. Which of the following is the most likely diagnosis?

- A. Euthyroid sick syndrome
- B. Grave's disease
- C. Hashimoto thyroiditis
- D. Silent lymphocytic thyroiditis
- E. Subacute thyroiditis

The correct answer is C. Hashimoto disease is a chronic, destructive lymphocytic infiltration of the thyroid glands. Many patients also have other autoimmune diseases. The description of the goiter in the question stem is typical of that produced by Hashimoto disease; the physical signs and symptoms of hypothyroidism are also present in longer-standing cases. Early in the disease, as in this case, T4 and TSH levels may be normal. Antithyroid peroxidase antibodies (against the specific antigen formerly detected with antimicrosomal antibodies) are observed in almost all patients with Hashimoto disease, but can also sometimes be detected in patients with Grave's disease and silent lymphocytic thyroiditis.

Euthyroid sick syndrome (choice A) occurs in patients with severe systemic illness who are clinically euthyroid but have abnormal thyroid function tests.

Grave's disease (choice B) causes diffuse toxic goiter and would exhibit both the signs and laboratory findings of hyperthyroidism.

Silent lymphocytic thyroiditis (choice D) usually occurs in postpartum women and may be a mild, usually spontaneously reversible, variant of Hashimoto disease. Subacute thyroiditis (choice E) is a virally caused acute inflammatory disease that causes thyroid tenderness and pain.

17. A 26-year-old woman has a 10-year history of type 1 diabetes mellitus. She has maintained strict glycemic control and has had no significant diabetic complications so far. On her last routine examination, her blood pressure is 125/78 mm Hg. Blood chemistry studies are within normal limits. Funduscopic examination reveals no evidence of diabetic retinopathy. **Which of the following is the most appropriate next step in management to prevent diabetic nephropathy?**

- A. Administration of ACE inhibitors
- B. Periodic measurement of serum creatinine levels
- C. Renal biopsy
- D. Screening for microalbuminuria with 24-hour urine collection
- E. Screening for microalbuminuria with dipstick examination of urine

The correct answer is D. Diabetes mellitus is the most common cause of chronic renal failure. Diabetic nephropathy is one of the most severe complications and manifests on average 10-15 years after the onset of diabetes. The earliest expression of diabetic nephropathy is microalbuminuria, while the patient is otherwise asymptomatic. This is the rationale for screening diabetic patients for microalbuminuria, which should be performed by 24-hour urine collection or on an early morning urine sample. In the latter case, dipstick screening (choice E) may not be sufficiently sensitive. The albumin: creatinine ratio in an early morning urine sample is a convenient alternative to 24-hour collection. A ratio <3.5 is normal and >10 is abnormal; between these two values, re-evaluation is recommended. During the phase of microalbuminuria, aggressive treatment, including strict glycemic and blood pressure control, is in order. Measurement of serum creatinine levels (choice B) would not be valuable in detecting preclinical renal damage. Treatment with ACE inhibitors (choice A) has been shown to slow progression of renal nephropathy, possibly because of the reduction of intra glomerular pressure. This treatment is not widely used if microalbuminuria absent and the patient is normotensive. Renal biopsy (choice C) is not indicated in asymptomatic diabetic patients as a method for prevention of renal disease.

18. A 58-year-old man with a 12-year history of type 2 diabetes mellitus complains of an ulcer in his right foot. Physical examination reveals a 1 cm irregular ulceration over the right metatarsal head, surrounded by an area of black gangrenous skin. The patient is admitted to the hospital and undergoes amputation of the right forefoot. **Which of the following measures would have been most effective in preventing this complication?**

- A. Appropriate instructions on self-care of the feet
- B. Doppler examination of the lower extremities
- C. Local application of platelet-derived growth factor
- D. Neurophysiologic and electromyographic studies
- E. Prophylactic treatment with cholesterol-lowering agents

The correct answer is A. Diabetic patients are particularly prone to gangrene of the feet. Sensory loss due to peripheral neuropathy, small vessel disease leading to ischemia, and secondary infections are the pathogenetic factors underlying this

pathology. Diabetes is the leading cause of non traumatic amputations. In addition to strict glycemic control to prevent vascular and neurologic complications, the most effective method of prevention is self-care. The patient should receive instructions on daily foot self-examination (to look for abrasions and blisters), wearing appropriate shoes, cutting toenails straight across, and avoiding barefoot walking.

19. A 26-year-old female presents with a six weeks history of galactorrhea. She has no other symptoms but takes medication for contraception, dyspepsia and migraine. Examination reveals slight galactorrhea with expression from both breasts but is otherwise normal. Investigations show: prolactin: 915 mU/L, (N: <450). **Which one of the following drugs may be responsible?**

- A. Codeine phosphate
- B. Metoclopramide
- C. Omeprazole
- D. Oral contraceptive pill
- E. Sumatriptan

The correct answer is B. Metoclopramide acts as a dopamine antagonist. Dopamine inhibits the release of prolactin from the anterior pituitary gland. Therefore, metoclopramide can predispose to hyperprolactinemia and consequent galactorrhea.

20. A 17-year-old female model is referred with a six month history of amenorrhoea and weight loss, for which no organic cause can be found. **Which of the following features would support your diagnosis?**

- A. Delusion of being overweight
- B. Delusions of poisoning
- C. Hypergonadotropic hypogonadism
- D. Hypotrichosis
- E. Watery diarrhoea

Correct answer is A. Features of anorexia nervosa include a phobic avoidance of normal weight, relentless dieting, self-induced vomiting, laxative use, excessive exercise, amenorrhoea, lanugo hair, hypotension, denial, and over perception of body image.

21. A 44-year-old man presents with new onset bilateral gynaecomastia. He has been diagnosed with Zollinger-Ellison syndrome in the last year. He underwent normal puberty at age 14. **Which of the following drugs would be most likely to cause?**

- A. Cimetidine
- B. Famotidine
- C. Lansoprazole
- D. Rabeprazole sodium
- E. Ranitidine

The answer is A. Cimetidine which is an H₂ receptor antagonist. Blockade of androgen-responsive receptors in the target organ appears to be the most likely mechanism involved. Other drugs listed above which may also be used as part of the treatment of Zollinger-Ellison syndrome have a much lower almost insignificant risk in the development of gynaecomastia.

Other drugs that can cause gynaecomastia include - spironolactone, digoxin, methyl dopa, gonadotrophins and cyproterone acetate.

22. An 18 year-old girl receives radioactive iodine as treatment of thyrotoxicosis. Which of the following is the most likely long-term complication of this treatment?

- A. Hypoparathyroidism
- B. Hypothyroidism
- C. Increased risk of developing cancer
- D. osteoporosis
- E. recurrent laryngeal nerve damage

Correct answer is B. RAI is safe and that is why it is given across all ages as a definitive treatment of thyrotoxicosis. The most likely side effect of radioactive iodine is hypothyroidism with approx 80% developing-hypothyroidism after therapy; there is no evidence to suggest that RAI is associated with any cancers. However, RAI must not be given to pregnant females particularly after the 12th gestational week as it would be taken up by the developing fetal thyroid causing fetal hypothyroidism and is also considered to be teratogenic. Recurrent laryngeal nerve damage is a potential risk of thyroid surgery, not RAI.

23. A 55-year-old female presents with episodic sweats and tremors which are relieved by glucose. She has recently gained approximately 6 kg in weight and drinks approximately 10 units of alcohol weekly. Her investigations show normal full blood count, normal urea and electrolytes and a fasting plasma glucose concentration of 80mg/dl. What is the most appropriate investigation for this patient?

- A. 72 hour fast
- B. CT scan of pancreas
- C. EEG
- D. Insulin and C-peptide concentration
- E. Oral glucose tolerance test

Correct answer is A. This patient describes symptoms suggestive of hypoglycaemia which are relieved by carbohydrate. The likely cause is an Insulinoma which is producing the weight gain.

The standard method for achieving diagnosis is a 72 hour fast by demonstration of inappropriately high insulin and C peptide during hypoglycaemia.

Measurement of C-peptide is useful for excluding factitious hypoglycaemia from self injection of insulin as insulin preparations contain no C-peptide.

24. A diagnosis of diabetes mellitus is being considered in 32-year-old woman who is 16 weeks pregnant. Her body mass index (BMI) was 22 kg/m². A 75g oral glucose tolerance test revealed fasting and 2 hrs post prandial blood glucose are 100 and 220 mg/dl. Which of the following is the most appropriate step in the management of this patient?

- A. Glipizide therapy
- B. Insulin therapy
- C. Low calorie diet
- D. Metformin therapy
- E. Repeat test in four weeks

Correct answer is B. The result confirms a diagnosis of gestational diabetes mellitus with the 2hr OGTT result above 200mg/dl. To minimize the fetal consequences of GDM (macrosomia, fetal malformations, still birth, IUGR etc), the patient's glycemia should be strictly controlled with insulin. A low calorie diet is inappropriate and neither metformin nor glipizide are licensed for use in pregnancy. There is no benefit from repeating the OGTT in 4 weeks as control is required now.

25. A 32 year-old woman presents with a one year history of secondary amenorrhoea. She had been prescribed temazepam and dihydrocodeine. On examination she had galactorrhea. Her serum prolactin was noted to be 6000 mU/l (<450 mU/l). What is the most likely diagnosis?

- A. Drug-induced hyperprolactinemia
- B. Hypothalamic lesion
- C. Hypothyroidism
- D. Pituitary microadenoma
- E. Stress

Correct answer is D. Pituitary microadenoma is the most like answer as prolactin level is markedly elevated. Other mentioned causes of hyperprolactinemia do not cause such elevation.

26. A 56-year-old man presents with an episode of collapse at home. He had been feeling increasingly tired with polyuria for the last 2 months and also reported a loss of libido. He had undergone a transsphenoidal surgery 2 years ago, followed by external beam radiation for a non-functioning pituitary adenoma. On examination, pulse was 102 beats per minute and regular, BP measured 105/65 mmHg in the lying position, dropping to 80/40 mmHg on standing. Heart sounds were normal. There was no galactorrhea to expression and testicular volume was normal. Investigations:

12 lead ECG	Normal	
Fasting plasma glucose	90 mg/dl	
Serum sodium	129 mEq/L	
Serum potassium	4.8 mEq/L	
Serum urea	50 mg/dl	
Serum creatinine	1.2 mg/dl	
Serum testosterone	4.5 nmol/L	(9-35)
Plasma luteinising hormone	0.3 U/L	(1-10)
Plasma thyroid stimulating hormone	0.1 mU/L	(0.4-5)
Plasma Free T4	7 pmol/L	(10-22)
Insulin like growth factor	15.2 nmol/L	(5.6-22.3)

Which is the most appropriate immediate treatment for this man?

- A. Desmopressin
- B. Growth hormone
- C. Hydrocortisone
- D. Testosterone
- E. Thyroxine

Correct answer is C. This patient is likely to have hypopituitarism secondary to radiation therapy. He requires replacement therapy of the deficient hormones, but the immediate treatment should be hydrocortisone therapy. This should not be missed as the consequences may be catastrophic.

27. A 25-year-old man had repeated measurement of blood pressure of 150/100 mmHg. Clinical examination was normal. No family history of hypertension. Which one of the following would suggest your diagnosis?

- A. 24 hour urinary protein excretion of 1.6g
- B. A Creatinine clearance of 90 mL/min (70-140)
- C. Left ventricular hypertrophy criteria on the ECG
- D. Serum potassium of 3.9 mEq/L
- E. The presence of arteriovenous nipping on fundoscopy.

Correct answer is A. It is rather young for a 25-year-old man to be hypertensive but the presence of such a degree of urinary protein would suggest that the lesion is of renal origin. The potassium concentration is normal and although it does not exclude Conn's it is certainly not suggestive. LVH would be found with sustained hypertension of any etiology as would A V nipping on fundoscopy. The creatinine clearance is normal.

28. A 16-year-old girl is noted to have persistent polyuria in excess of 4 liters per day whilst recovering from a head injury in a road traffic accident. Investigations reveal K⁺ 4.1 mEq/L, Ca²⁺ 9 mg/dl, glucose 90 mg/dl. Which one of the following is the most effective method of confirming the diagnosis?

- A. Autoantibodies to vasopressin neurons
- B. MRI of the hypothalamus and pituitary
- C. Serum & urinary Na
- D. Therapeutic trial of low dose DDAVP
- E. Water deprivation test

Correct answer is E. The history and confirmed polyuria are suspicious of diabetes insipidus which is not uncommon after head injury. This can be confirmed with a water deprivation test where failure of urine concentration would be expected. A MRI of the pituitary and hypothalamus may show no abnormality but would be undertaken after the diagnosis of DI is confirmed. Similarly anterior hormone assessment would also be undertaken after the diagnosis is confirmed. A therapeutic trial of DDAVP is only appropriate if the diagnosis of DI is confirmed as primary polydipsia can also be a feature of trauma and in these circumstances DDAVP may precipitate hyponatremia. Autoantibodies to ADH neurons are irrelevant.

29. A 70-year-old female who is receiving amiodarone for paroxysmal atrial fibrillation presents with tiredness and weight loss. Investigations revealed:

C-reactive protein	6 mg/L (<10)
Free Thyroxine	38 pmol/L (10-22)
TSH	<0.05 mU/L (0.4-5)

Which is the most appropriate treatment for this patient?

- A. Carbimazole
- B. Lithium therapy
- C. Prednisolone
- D. Radioiodine therapy
- E. Thyroidectomy

Correct answer is A. The most appropriate initial treatment of this amiodarone induced hyperthyroidism would be carbimazole. Despite stopping the amiodarone, thyrotoxicosis may persist for many months and so additional treatment is often required. Two types of amiodarone induced hyperthyroidism are recognized. The first being a consequence of iodine overload contained within the amiodarone of which the above is a typical example and the second type is due to an acute thyroiditis with thyroid cell destruction and increased parameters of inflammation. The former is best treated with carbimazole, the latter with prednisolone.

Endocrinology (MCQs)

30. A 54-year-old female presented with a neck swelling which has been more noticeable over the previous four months. Examination revealed a moderate goitre and clinically she appeared euthyroid. Investigations revealed:

T4	13.1 pmol/L (10-22)
TSH	5.3 mU/L (0.4-5)
Anti -microsomal antibodies	Positive

What is the most likely explanation of this patient's goitre?

- A. Anaplastic thyroid carcinoma
- B. De Quervain's thyroiditis
- C. Graves' disease
- D. Hashimoto's thyroiditis
- E. Multi-nodular goitre

Correct answer is D. This patient has goitre with subclinical hypothyroidism, as reflected by elevated TSH but normal T4 and elevated microsomal antibodies. This suggests a diagnosis of Hashimoto's thyroiditis.

31. A 48-year-old man presented with a 2-year history of generalized headaches. He had also noticed a recent increase in his shoe size. He denied any visual symptoms. He has no significant past medical history of note and is not on any regular medications. On examination, he had coarse facial features with Prognathism. His visual fields were full to confrontation. Investigations: Insulin like growth factor I: 43nmol/L (5.6-22.3), Plasma prolactin: 868 mU/L (<360). MRI scan suggests a pituitary adenoma measuring 8 mm without any extra sellar extension. What is the most appropriate treatment for this man?

- A. Bromocriptine
- B. Cabergoline
- C. Octreotide
- D. Pituitary surgery
- E. Radiotherapy

Correct answer is D. Surgery is the most appropriate primary therapy for acromegaly with a cure rate of above 80% expected for a tumour of this size. Although Somatostatin analogues are very effective at suppressing GH concentrations, their expense limits use on the longer term basis. However, in patients unsuitable for surgery or in those not cured following surgery SMS would be employed.

Endocrinology (MCQs)

32. A 16-year-old female presents with Acne, hypertension, amenorrhea, DM, and increasing weight. Which of the following features would be most suggestive of your diagnosis?

- A. Acanthosis Nigricans
- B. Hirsutism
- C. Interscapular fat pad
- D. Moon face
- E. Proximal myopathy

Correct answer is E. Proximal myopathy; easy bruising and thin skin are clinical features that are most suggestive of Cushing's syndrome. Otherwise, moon face, buffalo hump, and acanthosis nigricans could be features of obesity.

33. A 32-year-old woman presents with a four month history of amenorrhoea. She takes no specific therapy. She has two children and her husband has had a vasectomy. Examination reveals an obese lady but no other abnormality. Investigations revealed:

Serum cholesterol	180 mg/dl	
Serum LH	2.1 mU/L	3.0-6.6)
Serum FSH	2.2 mU/L	(3.3-10.1)
Serum prolactin	800 mU/L	(50-500)
Serum estradiol	2.1 pmol/L	(<3.0)

Which investigation is the most appropriate?

- A. 17 hydroxy-progesterone
- B. MRI of the pituitary
- C. Pregnancy test
- D. TSH
- E. Urine free cortisol concentration

Correct answer is B. This patient has hypogonadotrophic hypogonadism as evidenced by suppressed LH/FSH and a low oestradiol concentration. This would exclude pregnancy as a cause and polycystic ovarian syndrome is also unlikely. In the presence of a raised prolactin concentration, a microprolactinoma would be the most likely explanation for this patient's symptoms and results. This may be demonstrated by a pituitary MRI scan.

Endocrinology (MCQs)

34. A 48 year old woman presents with Cushingoid facies and hyperpigmentation of the skin on her face and chest. She has smoked 20 cigarettes per day for 30 years. Examination reveals no gross abnormalities. Her chest X-ray reveals a 2 cm irregularly shaped mass in the right upper lobe, in proximity to the mediastinum. A CT guided needle biopsy of the lung lesion is performed. **Which would be the most likely cytologic finding?**

- A. Adenocarcinoma
- B. Benign bronchial adenoma
- C. Bronchoalveolar cell carcinoma
- D. Small cell (oat cell) carcinoma
- E. Squamous cell carcinoma

Correct answer is D. This patient has typical features of ectopic ACTH secretion which is usually due to a small cell lung cancer. Other less common causes of ectopic ACTH secretion include bronchial carcinoid.

35. A 42-year-old man being investigated for diabetes and impotence is noted to have the following results:

Alanine aminotransferase	30 U/L
Aspartate aminotransferase	22 U/L
Fasting plasma glucose	180 mg/dl
Ferritin	500 µg/L (15-300)

Which one of the following would be the next most appropriate investigation?

- A. Bone marrow: smear and iron stain
- B. Liver biopsy
- C. Red cell protoporphyrin
- D. Serum transferrin receptors
- E. Transferrin saturation

Correct answer is E. This patient has a suspected diagnosis of hemochromatosis as suggested by the presentation and laboratory investigations including elevated ferritin. The next investigation would be measurement of transferrin saturation and then if elevated (above 45%) genotyping (Homozygosity for C282y mutations) would next be considered and would be expected to clinch the diagnosis. In the event of rarer mutations confirmation with liver biopsy may be required.

36. 45-year-old woman presents with excessive hair growth on her face, chest and lower abdomen. **Which of the following may be associated with her condition?**

- A. Cimetidine
- B. Cyproterone
- C. Hypoadrenalism
- D. Minoxidil
- E. Spironolactone

Correct answer is D. Drugs causing hirsutism/hypertrichosis include minoxidil,

Endocrinology (MCQs)

Phenytoin and cyclosporin. Polycystic ovaries and congenital adrenal hyperplasia are associated with increased androgens and hirsutism.

Hypoadrenalism may be associated with loss of hair especially pubic hair. Treatment of hirsutism is with anti-androgens (cyproterone, spironolactone), reduction of free androgens (estrogen therapy, OCP, weight loss), and cosmetic treatment for removal of hair.

37. A 26-year-old woman presents with episodes of dizziness mainly on standing. Her biochemical profile shows hyperkalemic acidosis. **Which underlying condition is she most likely to have?**

- A. Addison's disease
- B. Conn's syndrome
- C. Cushing's syndrome
- D. Pheochromocytoma
- E. Type 1 renal tubular acidosis

Correct answer is A. Her symptoms are suggestive of postural hypotension, which together with hyperkalemic (and hyponatremia) acidosis would strongly indicate the presence of Addison's disease. Cushing's and Conn's syndromes are associated with hypertension and hypokalemia. Renal tubular acidosis (RTA) is due to inability of the renal tubules to maintain acid-base balance. In type 1 (distal) RTA, there is hypokalemic acidosis with low urinary ammonium production. Patients present with hyperventilation / acidosis and muscular weakness from hypokalemia.

38. A 40 year-old woman presented with a five year history of weight gain associated with a one year history of amenorrhoea. Over this time she had also noticed hirsutism and had been trying to conceive. On examination, she had a BMI of 32 kg/m², a pulse was 84 beats per minute, and a blood pressure of 155/100 mmHg. **Which of the following would be the most useful initial investigation?**

- A. 24 hour urinary free cortisol concentration
- B. Combined 9 am ACTH and serum cortisol concentration
- C. High dose dexamethasone suppression test
- D. MRI of the adrenal glands
- E. Serum sodium and potassium concentrations

Correct answer is A. Urinary free cortisol is often recommended and has 95% specificity (85% specificity in the obese) and a 98% sensitivity. MRI of adrenal glands is not a screening test and should be done if there is high cortisol level with suppressed ACTH level. High dose dexamethasone suppression test is a late investigation to differentiate between pituitary adenoma and ectopic ACTH secretion. Sodium and Potassium concentrations offer nothing, nor do morning ACTH and cortisol.

Endocrinology (MCQs)

39. A 20-year-old man with asthma was found to be hypertensive. Investigations revealed:

Serum sodium	144 mEq/L
Serum potassium	2.4 mEq/L
Serum bicarbonate	30 mEq/L

Which one of the following is the most likely diagnosis?

- A. Addison's disease
- B. Churg Strauss syndrome
- C. Coarctation of the aorta
- D. Conn's Syndrome
- E. Inhaled Salbutamol therapy

Correct answer is D. This young asthmatic has a hypokalemic hypertension. This would therefore suggest a secondary cause which may be either hyperaldosteronism or pseudo hyperaldosteronism. Conn's syndrome is usually found in middle aged patients and would be unusual in a patient of this age but even so is probably the best answer here. Addison's disease is associated with hypotension and hyperkalemia. Salbutamol may cause hypokalemia particularly when given via nebulizer or particularly IV but should not produce hypertension.

40. A previously fit 30-year-old male presents with a two months history of weight loss, tiredness and nausea. Examination is free apart of BP of 100/60. Investigations showed normal blood picture, HbA1C, serum creatinine, ALT and TSH. Serum sodium is 130 mEq/L, and Serum potassium is 5.7 mEq/L. Which of the following is the most useful diagnostic investigation?

- A. 24h Urinary cortisol
- B. Anti-thyroid peroxidase antibody titre
- C. Free thyroxine concentration
- D. Insulin tolerance test
- E. Short Synacthen test

Correct answer is E. This patient presents with weight loss, tiredness and nausea. He has hyponatremia, hyperkalemia and what appears to be a mild primary hypoadrenalism. The most appropriate test would be a short Synacthen test.

41. A 32-year-old female presents with a 2 month history of agitation, menstrual irregularity and weight loss. Examination reveals a tremor and a palpable goitre with a bruit. Which of the following would most likely be present in this patient?

- A. Anti-thyroglobulin antibody
- B. Thyroid microsomal antibodies
- C. Thyroid peroxidase antibodies
- D. TSH receptor inhibiting antibodies
- E. TSH receptor stimulating antibodies

Endocrinology (MCQs)

Correct answer is E. This patient is most likely to have Graves' disease as revealed by the thyroid bruit. TSH receptor stimulating antibody is specific for Graves' disease and is present in the vast majority of cases.

42. A 38-year-old man presented with intermittent severe headaches. He was prescribed Spironolactone 50mg and Bendroflumethiazide 2.5mg daily for hypertension. On examination his pulse was 112 beats per minute, with regular rhythm, and blood pressure was 190/110 mmHg. Investigations revealed:

Serum sodium	132 mEq/L
Serum potassium	3.4 mEq/L
Serum urea	45 mg/dl

Which one of the following is the most useful investigation in establishing the diagnosis?

- A. 24 hour urinary 5-hydroxyindoleacetic acid concentration
- B. 24 hour urinary catecholamine concentration
- C. 24 hour urinary free cortisol concentration
- D. Aldosterone/Renin Ratio
- E. Radionuclide Hippuran renogram

Correct answer is B. Given the patients' young age, and markedly raised BP on treatment, we should consider an endocrine cause. The electrolyte disturbance is mild, and is irrelevant in this question. There is no clinical history to suggest Cushing's syndrome and primary aldosteronism is not associated with a tachycardia. An aldosterone: renin ratio would not be appropriate at this stage given that the patient is receiving spironolactone. The history of episodic headaches is central to this question, together with the tachycardia. These paroxysmal headaches suggest the diagnosis of pheochromocytoma; often the symptoms are vague, and rarely is the classical presentation encountered.

43. A 48-year-old woman with a recent diagnosis of type 2 diabetes is seen in the clinic because of deranged liver function Tests (LFTs). On examination she is obese with a BMI of 38.9 kg/m² and her recent LFTs showed:

AST	140 U/L
AST	150 U/L
Alkaline Phosphatase	250 U/L (45-105)

Which of the following is the most likely cause of this derangement?

- A. Alcoholic liver disease
- B. Autoimmune hepatitis
- C. Drug induced hepatitis
- D. Hemochromatosis
- E. Non-alcoholic steato-hepatitis

Correct answer is E. Diabetes Mellitus associated with obesity is the most likely cause of non alcoholic fatty liver disease (NAFLD) in this patient which is caused by fatty accumulation in the liver leading to inflammation. Patients who are obese, diabetic are advised to lose weight and control their diabetes. Usually, a low fat, low calorie diet is recommended along treatment to lower HbA_{1c}. Patients with NAFLD should avoid alcohol or other substances that could be harmful to the liver.

44. 51. A 48-year-old lady presented to her general practitioner with flu like symptoms, palpitation and tremors. On examination, her pulse was 98 beats per minute, regular. She did not have any eye signs. She had a diffuse, tender goitre. Investigations revealed:

Plasma thyroid-stimulating hormone	<0.01 mU/L	(0.4-5)
Plasma Free T ₄	66 pmol/L	(10-22)

Radioactive iodine uptake scan revealed less than 2% uptake within the thyroid gland. **What is the most appropriate treatment?**

- A. Carbimazole
- B. Lugol's iodine
- C. Propranolol
- D. Propylthiouracil
- E. Thyroidectomy

Correct answer is C. This patient is likely to have thyroiditis as suggested by the thyrotoxicosis and very low uptake on RAI uptake scan. The most appropriate treatment of thyroiditis is symptomatic control of thyrotoxic manifestations by beta-blockers.

45. A 25-year-old nurse presents with fatigue, ear pain tremors and a 7kg weight loss over the past one month. On examination she has a tachycardia and tender small goitre but no other abnormal findings. Thyroid function tests show:

Free thyroxine	40 pmol/L (10-23)
TSH	<0.01 mU/L (0.5-5.0)

Which one of the following would confirm your diagnosis?

- A. Elevated free T₃ concentration
- B. Failure of TSH to rise following IV TRH
- C. High titre of thyroid peroxidase antibodies
- D. Negligible 4 hour radioiodine thyroid uptake
- E. Thyroid Ultrasonography

Correct answer is D. This test result and symptoms may be consistent with thyroiditis and an elevated ESR with negligible uptake of RAI (as thyroid cells are attacked and hence release stored T₄ but fail to synthesize T₄) would be expected. In Grave's disease

you would expect homogenous uptake whereas a toxic nodule would show a solitary area of high uptake. Antibodies such as TPO and TSH receptor antibodies are found in autoimmune thyroid disease only.

46. A 55-year-old male attends for an insurance medical review. He has a family history of ischaemic heart disease and has been feeling tired of late. Investigations revealed:

Total Cholesterol	250 mg/dl
HDL-Cholesterol	45
Triglycerides	360
Free Thyroxine	10 pmol/L (10-22)
TSH	22.5 mU/L (0.4-5)

What is the most appropriate treatment?

- A. Atorvastatin
- B. Ezetimibe
- C. Gemfibrozil
- D. Omega-3 fish oils
- E. Thyroxine

Correct answer is E. This man has subclinical hypothyroidism with a normal T₄ but elevated TSH. Thyroid hormone is known to play a role in regulating the synthesis, metabolism, and mobilization of lipids. It is recognized that the lipid abnormalities tend to resolve following treatment with thyroxine.

47. A 52-year-old male with a five year history of type 2 diabetes is diagnosed with ischaemic heart disease and has recently commenced Simvastatin 40 mg daily as his cholesterol was 290 mg/dl. He re-attends complaining of various muscle aches and pains and you find that his liver function tests are deranged with elevated alkaline phosphatase. You stop the Simvastatin and his symptoms subside but his cholesterol remains elevated at 280 mg/dl. **Which of the following is the most appropriate strategy to treat this man?**

- A. Bezafibrate
- B. Ezetimibe
- C. No treatment required
- D. Rosuvastatin 10 mg daily
- E. Simvastatin 20 mg daily

Correct answer is B. This patient has ischaemic heart disease and type 2 diabetes mellitus and so should be receiving a statin as his cholesterol is also elevated. However, he is intolerant of the statin. Re-introduction of any statin at any dose would have a similar effect and the use of a fibrate may also have a similar side effect profile. Consequently, ezetimibe would be the most appropriate agent that would be expected to reduce cholesterol concentrations by 25%. It acts to prevent the absorption of cholesterol and is absorbed very little itself so consequently has few side effects.

Endocrinology (MCQs)

48. A 51-year-old man with type 2 diabetes and no previous history of CHD presents at annual review. Currently he is taking metformin 500 mg B.D., aspirin 75 mg O.D., perindopril 4 mg O.D. and Simvastatin 20 mg O.D. On examination, his blood pressure is 140/75 mmHg, he has background diabetic retinopathy and has a peripheral sensory neuropathy to light touch in the feet. Investigations revealed:

HbA1C	7.1%
Total cholesterol	152 mg/dl
Triglycerides	220 mg/dl
HDL-Cholesterol	31 mg/dl
LDL-Cholesterol	81 mg/dl

Which is the most appropriate treatment for this man?

- A. Cholestyramine
- B. Ezetimibe
- C. Fenofibrate
- D. No other treatment required
- E. Rosuvastatin

Correct answer is C. This patient's TC and LDL-C are at the currently advocated target levels in subjects at risk of CVD. Fenofibrate increases HDL-C by 10-15% and reduces plasma TG by 15-20%. Concomitant fibrate-statin use is associated with an increased risk of myopathy so safety and tolerability evaluation of combination therapy is important. When evaluating a patient with hypertriglyceridemia, secondary causes need to be considered, these include hypothyroidism, poorly controlled diabetes as well as excess alcohol intake.

49. A 38-year-old woman with a 10 year history of type 1 diabetes attends for annual review. She has background diabetic retinopathy, microalbuminuria with a urine Albumin: Creatinine ratio of 4.8 mg/dL (<3). Currently, she takes basal bolus insulin four times daily and lisinopril. She is a non-smoker, has a BMI of 30 kg/m² and a blood pressure of 125/70 mmHg. Investigations revealed:

HbA1C	7.3%
Total Cholesterol	159 mg/dl
Triglycerides	115 mg/dl
LDL-Cholesterol	85 mg/dl
HDL-Cholesterol	27 mg/dl

Which would be the most-appropriate treatment for this patient's lipid profile?

- A. Ezetimibe
- B. Fenofibrate
- C. No treatment required
- D. Omega-3 fatty acids
- E. Simvastatin

Endocrinology (MCQs)

Correct answer is E. Type 1 diabetes after a duration of 10 years is associated with a 2% annual CHD event rate, while the risk of cardiovascular events is increased in people with type 1 diabetes by factors such as co-existing microvascular complications, in particular nephropathy. Furthermore female gender is associated with an approximate 2 fold increase in relative CVD risk in type 1 diabetes, while other factors associated with increased CVD risk in type 1 diabetes include degree of glycemia, duration of diabetes, as well as classically recognized factors such as hypertension and dyslipidemia. The most recent CVD treatment guidelines advocate that treatment targets for LDL-C and TC of <80 mg/dl and <150 mg/dl in all people with diabetes over the age of 40 years and in those under 40 where there are co-existing risk factors. Therefore in this case Simvastatin would be the most appropriate treatment choice aiming for a treatment TC <150mg/dl

50. A 67-year-old man complains of insomnia, irritability, and palpitations for 3 months. He is currently taking amiodarone for cardiac arrhythmias. His blood pressure is 130/70 mmHg and his pulse is 110/min and regular. Which of the following is the most appropriate next step?

- A. Administration of propranolol
- B. Measurements of thyroxine and TSH
- C. Referral for psychiatric consultation
- D. Substitution of antidepressant drug
- E. Substitution of antihypertensive drug

The correct answer is B. Insomnia, irritability, and palpitations are nonspecific symptoms. They are frequent manifestations of hyperthyroidism. The patient takes amiodarone, so there should be prompt investigations for hyperthyroidism. Amiodarone causes symptomatic hyperthyroidism in a small percentage of patients (2 to 3%) and asymptomatic elevation of T3 and T4 with much greater frequency. Thus, thyroid hormone measurements should be combined with measurement of TSH, which is suppressed in the presence of significant thyroid hyperfunction.

Extended Matching Questions (EMQs)

1. The pancreas and diabetes.

- | | |
|--|--|
| A. Diabetic ketoacidosis | E. Maturity-onset diabetes of the young (MODY) |
| B. Gestational diabetes mellitus | F. The metabolic syndrome |
| C. Hyperosmotic non-ketotic diabetic coma (HONK) | G. Type 2 diabetes |
| D. Hypoglycaemia | |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 60 year-old woman whose recent-onset diabetes is entirely controlled by diet, metformin and Sulphonylurea.
2. A 15 year-girl with diabetes that is known to suffer from a mutation in the glucokinase gene.
3. A 50 year-old man suffering from mild fasting hyperglycemia, hypertriglyceridemia and central adiposity who has deranged function tests.
4. A 10 year-old boy who is found in his room drowsy, vomiting, severely dehydrated, suffering from acidotic breathing.
5. A 42 year-old pregnant woman with hyperglycemia who has family history of NIDDM and has previously given birth to a large baby.

Answers: G E F D B

2. The hypothalamus and the pituitary gland.

- | | |
|-------------------------|--|
| A. Antidiuretic hormone | F. Pituicyte |
| B. Gonadotrophs | G. Prolactinoma |
| C. Lactotroph | H. Sheehan's syndrome |
| D. Oxytocin | I. Supraoptic nucleus |
| E. Pars distalis | J. The syndrome of inappropriate ADH secretion |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. The cells which produce prolactin.
2. The hormone which does not function appropriately in diabetes insipidus.
3. A common cause of galactorrhea.
4. A cause of hyponatremia in a woman suffering from post-partum hemorrhage.
5. The cells which secrete follicle-stimulating hormone

Answers: C A G H B

3. Thyroid Disorders

- | | |
|------------------------------|--|
| A. De Quervain's thyroiditis | G. Multiple endocrine neoplasia (MEN) type 1 |
| B. Follicular carcinoma | H. Multiple endocrine neoplasia (MEN) type 2 |
| C. Graves' disease | I. Papillary carcinoma |
| D. Hashimoto's thyroiditis | J. Simple goitre |
| E. Hypothyroidism | K. Thyroglossal cyst |
| F. Lymphoma | |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 27-year-old woman presents with fever, sore throat and dysphagia. On examination she has a fine tremor and a diffusely tender thyroid. Radioisotope scan shows no uptake. ☐
2. A 43-year-old woman presents with weight loss despite a good appetite, constipation, frontal headaches and metrorrhagia. She also complains of recurrent dyspepsia and peptic ulcers. Her abdominal radiography shows renal stones. ☐
3. A 30-year-old woman presents with weight gain, constipation, lethargy and a flaky rash. ☐
4. A 37-year-old woman presents with weight loss, muscle weakness, oligomenorrhoea, diarrhoea and blurring of vision. On examination there is exophthalmos and proximal myopathy. ☐
5. A 19-year-old student presents with a neck swelling. On examination the swelling moves up with swallowing and protrusion of the tongue. ☐
6. A 49-year-old woman presents with goitre. On examination the thyroid is firm and rubbery. Thyroid microsomal antibodies are positive in high titre. ☐

Answers: A G E C K D

4. The adrenal glands.

- | | |
|-----------------------------------|--------------------------|
| A. Addison's disease | E. Cushing's syndrome |
| B. Bartter's syndrome | F. Pheochromocytoma |
| C. Congenital adrenal hyperplasia | G. Renal artery stenosis |
| D. Conn's syndrome | |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 45-year-old woman with buccal hyperpigmentation, weakness, abdominal pain, hyperkalemia and hyponatremia. ☐
2. A 36-year-old man with a hypochloremic metabolic alkalosis, low serum renin and a mass in the adrenal glands on MRI. ☐
3. A 30-year-old female who presents with episodic pallor, chest pain and hypertension. ☐
4. A rheumatology patient on long-term steroids who presents with weight increase, moon face, menstrual irregularity and purple striae. ☐
5. A young girl presenting with virilism and hirsutism. ☐

Answers: A D F E C

5. Endocrine Conditions.

- | | |
|------------------------|--|
| A. Acromegaly | G. Hyperthyroidism |
| B. Cushing's disease | H. Hypoparathyroidism |
| C. Diabetes insipidus | I. Melanoma |
| D. Diabetes mellitus | J. Nelson's syndrome |
| E. Hyperparathyroidism | K. Pheochromocytoma |
| F. Hyperprolactinemia | L. Syndrome of inappropriate ADH secretion (SIADH) |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 40-year-old woman presents with skin hyperpigmentation after bilateral adrenalectomy.
2. A 21-year-old woman presents with amenorrhoea, vaginal dryness and galactorrhea. On examination she has a bitemporal hemianopia.
3. A 26-year-old woman complains of weight gain, menstrual irregularity and hirsutism. Examination reveals proximal muscle weakness and BP of 150/100 mmHg.
4. A 28-year-old woman presents with chest tightness and anxiety attacks. She is hypertensive and her ECG shows left ventricular hypertrophy.
5. A 40-year-old woman is worried about her changing appearance and deepening voice. On examination she has coarse oily skin, enlarged tongue and proximal muscle weakness. She also mentions Paraesthesia in both hands of recent onset.

Answers: J F B K A

1. A 40-year-old woman presents with skin hyperpigmentation after bilateral adrenalectomy.
Answer is J: The removal of the adrenal glands has removed the physiological feedback inhibition of ACTH production. Excessive ACTH secretion gives rise to the increased pigmentation.
2. A 21-year-old woman presents with amenorrhoea, vaginal dryness and galactorrhea. On examination she has a bitemporal hemianopia.
Answer is F: Symptoms of vaginal dryness, amenorrhoea and galactorrhea are associated with hyperprolactinemia. The presence of a bitemporal hemianopia suggests that the cause is over secretion of prolactin by a prolactinoma. The treatment of choice is a resection via a transsphenoidal approach. Drugs that have an anti-dopaminergic effect, e.g. metoclopramide and phenothiazines, can also cause hyperprolactinemia.
3. A 26-year-old woman complains of weight gain, menstrual irregularity and hirsutism. Examination reveals proximal muscle weakness and BP of 150/100 mmHg.
Answer is B: Cushing's syndrome is the term used to describe a state of glucocorticoid excess. This is usually caused by increased ACTH secretion from a pituitary tumour (Cushing's disease). Other causes include ectopic secretion of ACTH by a tumour, e.g. small cell carcinoma, an iatrogenic excess of glucocorticosteroids and adrenal adenoma/carcinoma. Some patients have a distinctive 'moon-shaped' face (although a cushingoid appearance can also be caused by excessive alcohol consumption) with a buffalo lump visible at the neck and centripetal obesity. The skin is usually thin and bruises easily with purple striae. There is a higher incidence of osteoporosis and pathological fractures. Investigation aims to identify the cause. If plasma ACTH is very low/ undetectable, the lesion is likely to be an adrenal tumour. The high dose dexamethasone test can differentiate between ectopic ACTH/pituitary over secretion if plasma ACTH proves to be detectable. An ectopic source of ACTH is associated with poor cortisol suppression, but a pituitary source (Cushing's disease) is associated with complete or at least partial suppression.
4. A 28-year-old woman presents with chest tightness and anxiety attacks. She is hypertensive and her ECG shows left ventricular hypertrophy.
Answer is K: Pheochromocytoma is a tumour of the sympathetic nervous system that occurs in the adrenals in 90 per cent of cases. Ten per cent of pheochromocytoma is malignant. Patients usually have evidence of significantly raised blood pressure and present with a range of symptoms, including headache, palpitations, chest tightness, blanching and anxiety attacks. Surgical excision is the treatment of choice.
5. A 40-year-old woman is worried about her changing appearance and deepening voice. On examination she has coarse oily skin, enlarged tongue and proximal muscle weakness. She also mentions Paraesthesia in both hands of recent onset.
Answer is A: Acromegaly is caused by over-secretion of growth hormone (GH) from a pituitary adenoma. Most patients present with symptoms of change in appearance (particularly skin changes) or symptoms associated with mass effect of the tumour, e.g. headache, visual field defects. There are many changes in appearance caused by growth of soft tissues. Macroglossia and spade-like hands are particularly sensitive indicators of the presence of disease. Acromegaly is associated with hypertension, diabetes mellitus and cardiomyopathy with death usually occurring as a result of cardiovascular pathology. The oral glucose tolerance test is diagnostic. Patients with acromegaly fail to suppress GH and indeed there may be a paradoxical rise in GH levels. Trans-sphenoidal surgical excision is the treatment of choice.

6. Manifestations of endocrine disease

- | | |
|------------------------|---|
| A. Acromegaly. | E. Hyperthyroidism. |
| B. Cushing's syndrome. | F. Hypothyroidism. |
| C. Diabetes insipidus. | G. Pheochromocytoma. |
| D. Diabetes mellitus. | H. Syndrome of inappropriate ADH secretion (SIADH). |

For each clinical scenario below, give the most likely cause for the clinical findings. Each option may be used only once.

1. A 54-year-old man post kidney transplant complains of lethargy, weight gain and swelling of his ankles recently. There is no tenderness at the site of renal transplant and ultrasound demonstrates no abnormality. Blood pressure 175/100, fasting blood glucose 200 mg/dL, sodium 148 mEq/L, and potassium 3.5 mEq/L. ☐
2. A 78-year-old woman has become confused recently. On examination she is alert but not orientated in time or place, tired and uncooperative during physical examination. Abdominal examination reveals a lumpy abdomen and areas of erythema ab igne on both shins with some unusual hair loss over her eyebrows and scalp. ☐
3. 52-year-old hypertensive man presents with shortness of breath and cough productive of green sputum. He has been feeling weak, thirsty and thinks his high blood pressure medication may be at too high a dose as he has been urinating frequently for the past week and has lost a significant amount of weight over the last month. Chest radiography confirms a lower respiratory tract infection. sodium 147 mEq/L; potassium 4.9 mEq/L, urea of 50 mg/dl with a plasma osmolality of 330mOsm/L. Urine osmolality is verbally reported as being 'high'. ☐
4. A 42-year-old man presents with some recent changes in his vision and headaches, which he attributes from some new glasses. On examination he is a tall and heavy set man who is much tanned from a recent holiday. An area of un tanned skin around his left ring finger and he tells you regretfully that recently his wedding ring has become too tight and is being resized. ☐
5. A 38-year-old man presents with recurrent anxiety attacks. Three or four episodes, feeling light-headed with palpitations and a mild tremor that causes him to want to sit down until the feeling subsides. Focused questioning reveals he has become constipated recently and he is very anxious that this may be cancer as his family has a history of 'renal and pancreatic growths'. ☐

Answers: B F D A G

1. Answer is B: Cushing's syndrome manifests clinically with a plethora of clinical signs due to excess amounts of corticosteroid. The typical clinical picture is of an obese patient who exhibits a moon face appearance, abnormal fatty pads over the neck and upper back leading to the classical buffalo hump with easily bruised and paper thin skin. Hypertension and diabetes mellitus are commonly found due to both the mineralocorticoid and glucocorticoid effects of excess corticosteroid and a picture of hypernatremia and hypokalemia provides a clue to the pathology in the face of a strong clinical suspicion. Cushing's syndrome can be as a result of Cushing's disease, which describes the above clinical findings as a consequence of a primary pituitary neoplasm (usually adenoma). Other ACTH-dependent causes may be due to an ectopic focus of ACTH secretion such as a small-cell carcinoma of the lung. ACTH-independent causes include a primary adrenocortical tumour such as an adenoma or commonly exogenous steroid use such as that seen often in those requiring steroid immunosuppression for transplants or autoimmune disease.

2. Answer is F: Hypothyroidism may present in the elderly with very nonspecific signs and should be considered in the differential of anyone presenting with confusion (so-called part of the 'dementia' screen) and general deterioration with no readily identifiable cause. One of the most common endocrine disturbances alongside diabetes mellitus, it should not be missed as a cause of a range of symptoms from neurological signs, typically bradykinesia, reduced deep tendon reflexes and paresthesias from nerve entrapment (especially carpal tunnel syndrome) to abdominal pain from chronic constipation to mental disturbance manifest as confusion and apparent memory impairment. Other subtle signs of hypothyroidism include loss of the outer one-third of the eyebrows with male-pattern frontal balding, hypothermia (leading to the aptly named 'granny's tartan' – erythema ab igne from sitting close to or being in close contact with a source of heat such as a fire, electric heater or hot-water bottle), bradycardia and dry, coarse skin. Thyroid function tests are usually diagnostic and demonstrate a low free T4 with a compensatory high TSH in primary hypothyroidism. Very occasionally a low TSH and a low free T4 may be seen in the context of panhypopituitarism and assay of levels of sex hormones, ACTH and other pituitary hormones will confirm the diagnosis.

3. Answer is D: Diabetes mellitus can often present in a similar fashion to other endocrine diseases and thus it is important that investigations be interpreted in the correct fashion. Loss of weight, fatigue, polydipsia and polyuria are features of not only diabetes mellitus but also diabetes insipidus (DI) (resulting from loss of free water due to an inability to secrete or respond to vasopressin and thus be able to concentrate urine). Occasionally hysterical polydipsia manifests with the above clinical features and can be difficult to clinically distinguish from DI. In this case performing urine electrolyte and osmolality studies can differentiate between these two very different conditions; in DI there is secretion of free water and thus urine osmolality is very low, however, in hysterical polydipsia urine osmolality is normal as intake is matched by output keeping an overall isotonic balance to osmolality. Clues in the scenario suggesting a diagnosis of diabetes mellitus are the concurrent infection (that raises stress hormone levels e.g. cortisol causing

an increase in blood glucose levels), the high urine osmolality (due to high glucose load as the renal tubular threshold for glucose absorption has been exceeded) and the very high plasma osmolality. This can be approximated thus: $P_{osmo} \sim 2(Na) + K + urea + glucose \rightarrow$ units = mOsm/L

Plugging in the values for sodium, potassium and urea leaves the remaining component (glucose). This high glucose in the absence of any previous history of diabetes mellitus suggests a type 2 manifestation of high blood sugar; hyperosmolar hyperglycemic state (previously hyperosmolar non-ketotic coma, HONK). Urine dipstick will confirm the presence of heavy ketonuria (suggestive of diabetic ketoacidosis (DKA) or an element of HONK/DKA overlap) and an arterial blood gas would demonstrate the PH. As a general rule, any event such as surgery, illness or even myocardial infarction can manifest clinically in addition to the primary event with features of high blood glucose control, which may then progress to hyperosmolar hyperglycemic state or DKA.

4. Answer is A: The diagnosis of acromegaly can often be very subtle with those closest to the patient often bringing the changes to attention. It is often helpful to look at old photographs if there is a suspicion of acromegaly as coarsening of features, protrusion of the jaw (Prognathism) and change in clothing or shoe size may all point to a retrospective diagnosis. Most often due to a pituitary adenoma (80% macroadenoma, 20% microadenoma) visual symptoms may be a complaint alongside headache and even bedside visual field testing may reveal a defect, commonly a bitemporal hemianopia (tunnel vision). Sausage fingers (leading to an inability to wear rings), greasy coarse skin and a thickening of the forehead are all signs of growth-hormone excess that characterizes acromegaly. Trans-sphenoidal hypophysectomy is usually employed as a treatment modality, sometimes in conjunction with medical therapy to reduce the size of a very large macroadenoma or surgically incompletely resected tumour.

5. Answer is G: Pheochromocytoma is a rare tumour of the sympathetic nervous system notable for the production of catecholamines. Tumors may be adrenal or extra-adrenal and occur in both children and adults. The 'Rule of 10' mnemonic is a helpful way of remembering that pheochromocytoma are 10% ectopic, 10% malignant and 10% multiple. Symptoms may often be mistaken for anxiety attacks or cardiac in origin as palpitations, tremors, severe anxiety with no basis and chest pain may all be manifestations of the tumour. Severe hypertension is commonly associated and this may prompt more serious investigation of otherwise subtle symptomatology. Plasma metanephrine (metabolic products of catecholamine pathways) is the most sensitive investigation but a useful screening tool is the 24-hour urine collection for metanephrine and catecholamines. Imaging modalities should be used only on the basis of a strong clinical suspicion and/or biochemical evidence of a catecholamine disturbance as the incidence of adrenal mass (so-called incidentaloma) found on imaging has been estimated to be around the order of 7% in the elderly population.

MRI scanning of the abdomen is the preferred and most sensitive and specific modality and thus should be employed after positive biochemical tests have been confirmed.

Short Heading Questions (SHQs)

1- Features of hypoglycemia do not include

- A. Drenching sweat
- B. Tachycardia
- C. Tachypnea
- D. Brisk jerk
- E. Paraesthesia

2- Earliest changes observed by ophthalmoscope in background retinopathy of diabetes is

- A. Venous dilatation
- B. Micro aneurysms
- C. Increased capillary permeability
- D. Arterio-venous shunts
- E. Exudates

3- Which is not a part of metabolic 'syndrome x'?

- A. Hyperlipidemia
- B. Obesity
- C. Ischaemic heart disease
- D. Hypertension
- E. Insulin resistance

4- All are features of diabetic ketoacidosis except:

- A. Hyperthermia
- B. Drowsiness
- C. Dehydration
- D. Air hunger
- E. Abdominal pain

5- Commonest cause of coma in a diabetic is:

- A. Diabetic ketoacidosis
- B. Lactic acidosis
- C. Hyperosmolar coma
- D. Hypoglycaemia
- E. Uremic coma

6- Neurological features of myxoedema include all of the following except:

- A. Delayed relaxation of ankle jerk
- B. Cerebellar ataxia
- C. Hypertonia
- D. Coma
- E. Carpal tunnel syndrome

- 7- Myxoedema coma is characterized by:
 - A. Hypertension
 - B. Tachycardia
 - C. Euthermia
 - D. Hypoventilation
 - E. Extensor plantar response
- 8- Commonest cause of unilateral exophthalmos is:
 - A. Cavernous sinus thrombosis
 - B. Retrobulbar tumour
 - C. Chloroma
 - D. Thyrotoxicosis
 - E. Pseudotumor cerebri
- 9- 'Microalbuminuria' is urinary albumin excretion ratio between:
 - A. 10-100 µg/min
 - B. 20-200 µg/min
 - C. 30-300 µg/min
 - D. 40-400 µg/min
 - E. 50-500 µg/min
- 10- Sleeping pulse rate is not increased in:
 - A. Anxiety neurosis
 - B. Rheumatic carditis
 - C. Pulmonary tuberculosis
 - D. Atropinized patient
 - E. Depression
- 11- Which is not a feature of autonomic neuropathy in diabetes:
 - A. Retrograde ejaculation
 - B. Gustatory sweating
 - C. Mononeuritis multiplex
 - D. Hypoglycemic unresponsiveness
 - E. Postural hypertension
- 12- Beta-blockers can be used in all except:
 - A. Glaucoma
 - B. Bronchial Asthma
 - C. Anxiety states
 - D. Angina pectoris
 - E. Migraine

- 13- Cardiovascular findings of thyrotoxicosis do not include:
 - A. Loud S1
 - B. Palpitation
 - C. Water-hammer pulse
 - D. Ejection click
 - E. Pericardial effusion
- 14- Acromegaly is associated with all of the following except:
 - A. Acanthosis nigricans
 - B. Fibromata Mollusca
 - C. Micrognathia
 - D. Cardiomegaly
 - E. Excessive sweating
- 15- Cushing's syndrome does not give rise to:
 - A. Hirsutism
 - B. Peripheral neuropathy
 - C. Purple striae
 - D. Acne
 - E. Stunted growth
- 16- Sheehan's syndrome presents with:
 - A. Cardiac failure
 - B. Persistent lactation
 - C. Fever
 - D. Striking cachexia
 - E. Amenorrhea
- 17- Hypocalcaemia is produced by all except:
 - A. Hysterical hypoventilation
 - B. Acute pancreatitis
 - C. Chronic renal failure
 - D. Osteomalacia
 - E. Hypoproteinemia
- 18- Gynaecomastia may be produced after treatment with all except:
 - A. Spironolactone
 - B. Digitalis
 - C. Cimetidine
 - D. Rifampicin
 - E. INH

- 19- Primary hyperaldosteronism is not featured by:
- Diastolic hypertension
 - Paraesthesia
 - Alkalosis
 - Edema
 - Hypokalemia
- 20- Thyrotoxicosis may be featured by all except:
- Myopathy
 - Pretibial myxoedema
 - Hypernatremia
 - Atrial fibrillation
 - Ophthalmopathy
- 21- Which of the following is not associated with hypothyroidism:
- Loss of libido
 - Weightless
 - Cardiac failure
 - Organic psychosis
 - Menorrhagia
- 22- All of the following are featured by dermal hyperpigmentation except:
- Conn's syndrome
 - Bronchogenic carcinoma
 - Addison's disease
 - Hemochromatosis
 - Nelson's syndrome
- 23- Hyperparathyroidism is not featured by:
- Acute pancreatitis
 - Nephrocalcinosis
 - Palpable neck swelling
 - Pseudogout
 - Hypocalcaemia
- 24- Pheochromocytoma is not associated with:
- Weight gain
 - Fear of death (angor animi)
 - Paroxysmal hypertension
 - Constipation
 - Sweating

- 25- Features of Addison's-disease do not include:
- Diarrhoea
 - Dizziness
 - Dermatitis
 - Dehydration
 - Lymphocytosis
- 26- Pseudohypoparathyroidism is not associated with:
- Cataract
 - Raised level of plasma PTH
 - Mental retardation
 - Reduced level of plasma phosphate
 - Short stature
- 27- All of the following are noted in Cushing's syndrome except:
- Psychosis
 - Systemic hypertension
 - Sexual precocity
 - Osteoporosis
 - Hirsutism
- 28- Secondary hyperaldosteronism is associated with all except:
- Congestive cardiac failure
 - Nephrotic syndrome
 - SIADH
 - Cirrhosis of liver
 - Renal artery stenosis
- 29- All of the following drugs may produce galactorrhea except:
- Salicylates
 - Reserpine
 - Cimetidine
 - Methyldopa
 - Metoclopramide
- 30- Brown tumor' of bone is found in:
- Primary hyperparathyroidism
 - Pseudohypoparathyroidism
 - Secondary hyperparathyroidism
 - Hyperparathyroidism
 - Ewing sarcoma

Endocrinology (SHQs)

31- Primary aldosteronism is not featured by:

- A. Low plasma rennin
- B. Hypokalemia
- C. Edema
- D. Systemic hypertension
- E. Adrenal hyperplasia

32- Vanillylmandelic acid (VMA) excretion is increased in urine in:

- A. Conn's syndrome
- B. Congenital adrenal hyperplasia
- C. Testicular feminization syndrome
- D. Pheochromocytoma
- E. Vipoma

33- Commonest cause of thyrotoxicosis is:

- A. Multinodular goiter
- B. Hashimoto's thyroiditis
- C. Graves' disease
- D. Well-differentiated carcinoma
- E. Toxic adenoma

34- In pregnancy, anti-thyroid treatment of choice is:

- A. Radio-active iodine
- B. Carbimazole
- C. Subtotal thyroidectomy
- D. Corticosteroid
- E. Propylthiouracil

35- Anorexia nervosa is not associated with:

- A. Hypokalemia
- B. Primary amenorrhoea
- C. Exclusively in females
- D. Low FSH and LH
- E. Thyroxin level

Endocrinology (SHQs)

Answer key:

- 1- C
- 2- B
- 3- C
- 4- A
- 5- D
- 6- C
- 7- D
- 8- D
- 9- B
- 10- A
- 11- C
- 12- B
- 13- D
- 14- C
- 15- B
- 16- D
- 17- A
- 18- D
- 19- D
- 20- C
- 21- B
- 22- A
- 23- C
- 24- A
- 25- C
- 26- D
- 27- C
- 28- C
- 29- A
- 30- A
- 31- C
- 32- D
- 33- C
- 34- E
- 35- C

NEPHROLOGY

Multiple Choice Questions (MCQs)

1. A 50-year-old man with progressive renal failure over 4 years presents with recent onset of numbness of his feet and hands. He is on a dietary regimen of water and salt restriction. Examination shows decreased sensation to pinprick and vibration stimuli below the knee and in the hands, and absence of ankle reflexes. Blood studies show: Hematocrit 35%, Sodium 140 mEq/L, Potassium 5.0 mEq/L, Urea nitrogen 98 mg/dL, Creatinine 8.5 mg/dL. **Which of the following is the most appropriate next step in management?**

- A. Administration of bicarbonate supplements
- B. Arterial blood gas analysis
- C. Initiation of dialysis
- D. Treatment with recombinant erythropoietin
- E. Treatment with vitamin B 12

The correct answer is C. This patient with chronic renal failure is manifesting typical signs and symptoms of uremic peripheral neuropathy. Sensorimotor neuropathy in a "stocking and glove" distribution is the most common form. Usually, peripheral neuropathy develops when the glomerular filtration rate falls below 10% of normal values. This is one of the indications for starting renal replacement therapy (i.e., dialysis). Parenthetically, uremic manifestations that warrant initiation of dialysis treatment include pericarditis, coagulopathy, fluid overload not responsive to diuresis, hyperkalemia resistant to dietary restriction, severe acidosis (pH <7.20), and neurologic complications (e.g., encephalopathy, seizures, and neuropathy).

2. A 78-year-old man is admitted to the hospital because of the acute onset of dysuria, frequency profound malaise, and shaking chills. His temperature is 39.8°C, blood pressure is 105/65 mm Hg, pulse is 120/min, and respirations are 28/min. Examination reveals pronounced tenderness in the right costovertebral angle. Urinalysis shows: Red blood cells 10/hpf, White blood cells 100/hpf, Protein 2+, Casts None. A urine sample is sent for cultures and results are pending. **Which of the following is the most appropriate next step in management?**

- A. Infusion of Ringer's lactate solution
- B. Single-dose administration of cephalixin
- C. Single-dose administration of trimethoprim sulfamethoxazole
- D. Treatment with intramuscular ceftriaxone plus oral doxycycline
- E. Treatment with IV ampicillin and gentamicin

The correct answer is E. The clinical picture is consistent with acute pyelonephritis (upper urinary tract infection), a severe condition that should be promptly treated with wide-spectrum antibiotic therapy without waiting for the culture results to be available. Patients usually need to be admitted to the hospital. Blood and urine are cultured to identify the agent and determine susceptibility to antibiotics. Meanwhile, treatment with

IV ampicillin and an aminoglycoside (usually gentamicin) is started. This combination affords a wide-spectrum coverage that is usually effective against the most common pathogens associated with urinary tract infections, in particular *Escherichia* and *Proteus*

3. A 72 year-old man who was recently diagnosed with lymphoma has been undergoing chemotherapy for the past 3 weeks. He now develops acute renal failure. His laboratory studies reveal a creatinine of 4 mg/dL, urea nitrogen of 15 mg/dL, and uric acid level of 20 mg/dL. **Which of the following would most likely have prevented this patient's acute renal failure?**

- A. Allopurinol
- B. Diphenhydramine
- C. Furosemide
- D. N-acetylcysteine
- E. Nifedipine

The correct answer is A. Instituting chemotherapy in this patient has resulted in tumor lysis syndrome (TLS). TLS results from the acute lysis of lymphoma cells and the acute renal failure from the precipitation of uric acid and hypoxanthine in the renal collecting tubules. Patients should receive allopurinol, a xanthine oxidase inhibitor that reduces the synthesis of uric acid, and should be aggressively hydrated prior to the initiation of chemotherapy to reduce the incidence of TLS.

4. A 12 year-old boy presents with acute onset of morbilliform rash, fever, malaise, and oliguria. These manifestations began 1 week after starting treatment with ampicillin for streptococcal pharyngitis. His temperature is 38.8°C, blood pressure is 115/75 mm Hg, pulse is 95/min, and respirations are 16/min. Urine analysis shows microhematuria, leukocyturia with numerous eosinophils, and occasional white blood cell casts. Proteinuria is absent. Blood studies show elevated antistreptolysin titers and moderate eosinophilia. BUN is 42 mg/dL, and serum creatinine is 2.5 mg/dL. **Which of the following is the most likely diagnosis?**

- A. Acute interstitial nephritis
- B. Acute pyelonephritis
- C. Acute tubular necrosis
- D. Post-streptococcal glomerulonephritis
- E. Vasculitis

The correct answer is A. Acute interstitial nephritis is probably the second most common cause of intrinsic renal failure (after acute tubular necrosis). The most frequent causative factors are drugs, including penicillins (especially methicillin), cephalosporins, sulfonamides, NSAIDs, rifampin, and Phenytoin. Coexistence of skin rash, eosinophils in the urine, and blood eosinophilia is an important diagnostic clue. Acute pyelonephritis (**choice B**) often develops in the setting of some underlying urologic diseases. In children, the most common underlying factor is vesicoureteral reflux. High fever, flank pain, and abundant pyuria are the main clinical manifestations. Acute tubular necrosis (**choice C**) develops as a result of severe hypoxia, prolonged prerenal azotemia, exogenous nephrotoxic agents (e.g., aminoglycosides), or endogenous substances (e.g., myoglobinuria, hemoglobinuria, or severe hyperuricemia). Granular casts, but not eosinophils, are found in the urine.

Nephrology (EMQs)

5. A 56-year-old woman with a long history of painful osteoarthritis of the hip and lower back comes to medical attention because of polyuria for 3 months. She denies any previous urinary tract infection or renal disease. Her blood pressure is 135/80 mm Hg. Urine dipstick test shows hematuria and mild proteinuria. Blood studies reveal mild microcytic anemia, hyperkalemia, and normal uric acid levels. Ultrasonography shows kidneys of normal size. Intravenous pyelography (IVP) demonstrates the presence of characteristic "ring shadow" defects at the tips of renal papillae. **Which of the following is the most likely cause of this condition?**

- A. Analgesic nephropathy
- B. Lead exposure
- C. Multiple myeloma
- D. Obstructive uropathy
- E. Polycystic kidney disease

The correct answer is A. The long history of osteoarthritis should suggest chronic analgesic abuse as the underlying etiology of this renal condition, which is chronic tubulointerstitial nephritis. Analgesic nephropathy affects patients who consume significant amounts of aspirin, NSAIDs, phenacetin, or acetaminophen for at least 3 years. Clinical surveys have shown that patients often underestimate the amount of analgesics that they ingest daily. Note the main diagnostic clues of chronic tubulointerstitial nephritis: progressive polyuria because of inability of the renal tubules to concentrate urine, hyperkalemia, presence of radiologic signs of papillary necrosis (often associated with this condition), concomitant microhematuria, and mild proteinuria. Microcytic anemia may develop because of gastrointestinal blood loss secondary to the same drugs.

6. A 45-year-old woman with systemic lupus erythematosus (SLE) comes for a routine checkup. Her condition has been stable for several years, and she currently is not taking any medication. Blood chemistry studies and hematologic parameters are remarkable for blood urea nitrogen (BUN) of 23 mg/dL, a creatinine of 1.6 mg/dL, and a mild normocytic anemia. The erythrocyte sedimentation rate is 18 mm/hr. Urine analysis shows microhematuria and mild proteinuria. **Which of the following is the most appropriate next step in management?**

- A. Renal biopsy
- B. Repeat urine analysis at next routine examination
- C. Sequential serum complement and ANA studies
- D. Treatment with corticosteroids
- E. Treatment with cyclophosphamide

The correct answer is A. Renal involvement is one of the most common manifestations of systemic lupus erythematosus (SLE) and a major cause of morbidity and mortality when renal abnormalities are detected in patients with SLE, a renal biopsy must be performed. SLE may, in fact, lead to various types of morphologic changes, which can be evaluated only by biopsy examination and have fundamental implications for choosing the most appropriate therapy. Such changes have been divided into five types. Type I and II lesions (normal and mesangial proliferative, respectively) require no treatment. Type I and IV lesions (focal segmental proliferative and diffuse proliferative, respectively) require aggressive immunosuppressive treatment. Type V lesions

Nephrology (MCQs)

(membranous glomerulopathy) require immunosuppression if superimposed proliferative lesions are found.

7. A 33-year-old male receiving regular hemodialysis is noted to have plasma potassium of 6.9 mEq/L before a dialysis session. Although normally his potassium is less than 5.5 mEq/L. **Which food combination from the dietary history would be most likely to cause the high potassium concentration?**

- A. Cereal, toast, biscuits.
- B. Filter coffee, tea, boiled potatoes.
- C. Milk, butter, plain yoghurt
- D. Milk, ham, chicken.
- E. Tomato, potato crisps, banana.

The correct answer is E. In particular tomato and banana have high potassium content and patients should be advised to avoid such foods.

8. An 81-year-old man was admitted with renal failure due to benign prostatic hypertrophy. His bladder was drained with a urethral catheter followed by a diuresis of > 3L per day. After two days he became progressively drowsy. **What is the most likely cause for his reduced level of consciousness?**

- A. hyperglycemia
- B. hypocalcaemia
- C. hypomagnesaemia
- D. hyponatremia
- E. metabolic acidosis

The correct answer is D. Amelioration of urinary obstruction and subsequent recovery initially results in a large electrolyte and water loss. Osmotic cerebral changes precipitated by urinary sodium loss, the major intravascular cation, are the cause of drowsiness. Hypocalcaemia and hypomagnesaemia may occur as tubular reabsorption is suboptimal in the early stages of recovery, but is unlikely to affect conscious level. Acid-base status should improve after relief of the obstruction. Hyperglycemia is not a common complication of recovery from obstructive uropathy.

9. A 25 year old man presented with renal failure; creatinine was 8.5 mg/dl. You are in a dilemma whether it is acute or chronic renal failure. **Which of the following can help?**

- A. An increased urinary Na excretion
- B. Hyperkalemia
- C. Hypophosphatemia
- D. Left ventricular hypertrophy on the ECG
- E. Renal size on ultrasound scan

The correct answer is E. Small kidneys on US suggest chronic renal failure but the following causes of chronic renal failure can present with normal/enlarged kidneys; amyloidosis, polycystic kidney disease, diabetic glomerulosclerosis, scleroderma and rapidly progressive glomerulonephritis. Decreased fractional Na clearance, hyperphosphatasemia and hyperkalemia are features of acute or chronic renal failure. LVH is probably more likely to be seen in chronic renal failure but is not reliable.

10. A 70-year-old man is admitted to hospital complaining of a twelve-day history of loin pain, fevers and occasional rigors. On examination, his temperature is 37.9°C . The renal function is normal. Urine analysis of a mid stream urine shows: White Cell Count $>100/\text{mm}^3$, Red Cell Count $>50/\text{mm}^3$, and no organisms seen, with no growth. Which would be your first investigation of choice?

- A. CT abdomen and pelvis
- B. Intra Venous Urogram (IVU)
- C. Prostatic Specific Antigen (PSA) measurement
- D. Transthoracic echocardiogram
- E. Ultrasound scan renal tract

The correct answer is E. Renal cell carcinomas may present in a variety of ways, with only a minority being diagnosed with the classical triad of hematuria, loin pain and a palpable mass. Relatively common presentations include anaemia, hypertension, pyrexia of unknown origin, fatigue and increased plasma viscosity. Less common presentations include hypercalcaemia, polycythaemia, liver dysfunction, enteropathy or myopathy. Urine analysis may show sterile pyuria, as here. Other causes of sterile pyuria are partially treated UTI, TB of the renal tract, urethritis and sexually transmitted diseases, acute glomerulo-nephritis, tubule-interstitial diseases, adult polycystic kidney disease, and renal stones.

Ultrasound scan of the renal tract would be the first investigation of choice, as it is able to pick up 95% of renal cell carcinomas $>1\text{ cm}$ in diameter. It would also exclude infective or inflammatory collections within the renal tract. If required a CT +/- guided biopsy could be obtained to prove the diagnosis. An IVU was considered the investigation of choice before the advent of ultrasound. A chest x-ray and bone scan would be required to complete the basic investigations.

11. A 62-year-old man with a longstanding history of hypertension is seen in the outpatient clinic. Investigations showed creatinine 2.8 mg\% and urine analysis show blood ++ and protein 1.8 gm/L . Ultrasound scan of kidneys both kidneys were 8.5 cm . What is the best investigation to diagnose the cause of his renal impairment?

- A. Intravenous urogram (IVU)
- B. Isotope renogram
- C. Renal angiogram
- D. Renal biopsy
- E. Retrograde pyelogram

The correct answer is D. This patient has a long history of hypertension; therefore it should have been appropriately controlled in the clinic. The patient now presents with bilaterally shrunken kidneys, renal impairment and evidence of a glomerulonephritis. In the presence of mild to moderate hypertension, proteinuria indicates either underlying renal disease or renovascular disease. As this patient has blood and protein in the urine, on the background of impaired renal function and shrunken kidneys, the best investigation would be to perform a renal biopsy (assuming the hypertension was controlled). This would differentiate between renovascular disease and glomerulonephritis, which may be reversible. If this patient had the above clinical findings without blood and protein in the urine, then the investigation of choice would be a renal angiogram, to diagnose renovascular disease.

12. A 63-year-old woman noted to be hypertensive. She has a past history of hip osteoarthritis for which she has taken regular paracetamol. On examination she is obese with a BMI of 35, has a blood pressure of $180/100\text{ mmHg}$ and glycosuria is noted. Her Investigations show:

Fasting plasma glucose	329 mg/dl
Serum urea	60 mg/dl
Serum creatinine	1.5 mg/dl
24 hour urine protein concentration	1.8 g/d
Normal ultrasonic appearances of both kidneys	

Which of the following is the most likely diagnosis?

- A. Analgesic nephropathy
- B. Chronic glomerulonephritis
- C. Diabetic nephropathy
- D. Hypertensive nephropathy
- E. Ischaemic nephropathy

The correct answer is C. This patient is diabetic and has proteinuria. Although diabetic nephropathy usually takes 5 or more years to evolve, this patient is likely to have had the condition for many years prior to diagnosis. Ischaemic nephropathy, due to renal artery stenosis is unlikely in the presence of a normal renal ultrasound. Analgesic nephropathy would be a consequence of NSAIDs not paracetamol. Hypertensive nephropathy is a possibility but is less likely in the context of her proteinuria and moderately elevated BP.

13. A 25-year-old man developed bilateral loin pain and frank hematuria. His symptoms had started 24 hours after developing a sore throat. His blood pressure was $140/90\text{ mmHg}$. Urinalysis was positive for blood (4+) and protein (2+). What is the most likely diagnosis?

- A. IgA nephropathy
- B. Microscopic polyangiitis
- C. Nephrolithiasis
- D. Post-streptococcal glomerulonephritis
- E. Septicemia

The correct answer is A. The acute onset of the disease is suggestive of IgA nephropathy which characteristically occurs in young males in their 20s and 30s. Hematuria occurs within 12-24 hours of pharyngitis, accompanied also by loin pain, muscle pain and fever. Prognosis is usually good especially in children. In adults, between 25-50% may develop end-stage renal failure. No specific treatment available. Classically, patient has streptococcal infection 1-3 weeks before the onset of acute nephritic syndrome (post-strep GN). There is a long prodromal systemic illness lasting months or years in microscopic polyangiitis which differs from Wegener's granulomatosis in its absence of respiratory tract granulomatous inflammation.

Nephrology (EMQs)

14. A 72-year-old male presented with depression after the death of his wife. His notes also reveal that he has a two-year history of urinary hesitancy and poor stream. His GP prescribed him some medication and the following day he developed acute urinary retention. Which of the following drugs is most likely to have precipitated the urinary retention?

- A. Amitriptyline
- B. Diazepam
- C. Fluoxetine
- D. Venlafaxine
- E. Zopiclone

Correct answer is A. Amitriptyline has anticholinergic effects being associated with tachycardia, dry mouth and urinary retention. These features are not typical of selective serotonin reuptake inhibitors (SSRIs) such as Venlafaxine and Fluoxetine with urinary retention and dry mouth rarely reported. Diazepam, a benzodiazepine does not have anticholinergic effects. Zopiclone is a benzodiazepine like agent whose side effects include drowsiness.

15. A 45-year-old male presents with a long-standing history of hypertension. Investigations show a urea of 75 mg/dl and a Creatinine of 1.9 mg/dl. You suspect acute glomerulonephritis. Which one of the following would suggest that diagnosis?

- A. 24 hour urinary protein excretion of 0.8g
- B. Dyslipidemia
- C. RBC casts in urinary sediment
- D. Shrunken glomeruli on renal biopsy
- E. Unilaterally smaller kidney

The correct answer is C. Casts containing erythrocytes (red cell casts) are an indication of renal bleeding, and are typically found when there is acute glomerular inflammation caused by glomerulonephritis or vasculitis. Choices A, B, D, and E are non specific and do not suggest an acute glomerulonephritis.

16. A 46-year-old woman develops nephrotic syndrome and is awaiting further tests to establish the underlying aetiology. Corticosteroids were effective in reversing her condition. Which of the following is the most likely etiology?

- A. Membranous nephropathy
- B. Mesangial IgA disease
- C. Minimal change disease
- D. Primary amyloidosis
- E. Renal vein thrombosis

The correct answer is C. Although, there is no known effective treatment for IgA nephropathy, there have been reports of favorable response to long term corticosteroid therapy. 80% adults with minimal change GN will respond to steroids, although remissions can take up to 16 weeks. Membranous GN does not respond to steroid treatment. No specific treatment is available to cause regression of amyloid deposits.

Nephrology (MCQs)

17. A 30-year-old male presents with edema and proteinuria. On examination his blood pressure 130/85. Ultrasound of renal tract: normal right kidney, absent Lt Kidney. Lab investigations revealed:

Creatinine	1.2 mg/dl
Albumin	25 g/L
Urinalysis	No blood
Protein	++++
Urinary protein excretion	7g/24hr

Which is the most appropriate course of action for this patient?

- A. Albumin transfusion
- B. Angiotensin converting enzyme inhibitor therapy
- C. High protein diet
- D. Renal biopsy
- E. Trial of steroid therapy

Correct answer is E. This patient has Nephrotic syndrome, which is a combination of:

- Proteinuria (usually > 3g/24 hrs)
- Hypoalbuminemia (<35g/L)
- Edema
- Hyperlipidemia

The most appropriate course of action here would be to undergo a trial of steroid therapy. Ideally a renal biopsy would be indicated to determine the cause of the nephrotic syndrome; however as this patient only has 1 kidney then this would be considered a relative contraindication for such a procedure. A high protein diet / albumin transfusion would be of little to no benefit - and the latter would need to be salt poor. ACE inhibitors reduce proteinuria and slow deterioration in GFR. In this case given the patients age he may well have minimal change GN (commonest in children) - which is normally steroid responsive. In the young adult histological diagnoses are in general: Minimal change > Mesangiocapillary > FSGS > Lupus > Membranous > Diabetes. In general steroids are tried first and then 2nd line agents such as cyclosporin and cyclophosphamide are introduced if needed.

18. A 68-year-old male diagnosed with nephrotic syndrome receives steroid therapy without benefit. His investigations show an albumin of 20 g/L, Total cholesterol of 320 mg/dl, dipstick urine analysis reveals +++ protein and a renal biopsy shows focal segmental glomerulosclerosis. Which one of the following is most likely to preserve renal function?

- A. Dietary salt restriction
- B. Low dietary protein intake
- C. Ramipril
- D. Simvastatin
- E. Warfarin

The correct answer is C. Approximately 50% of subjects with FSGS do not respond to steroid therapy but ACE inhibitors are a recognized strategy to slow the progression of

renal disease. This patient is clearly at high risk of cardiovascular disease with very high cholesterol but the question specifically asks about renal disease.

19. A 65-year-old female is referred with a long history of hypertension and episodic urinary tract infections. Dipstick analysis of the urine shows Blood +++ together with protein +++. Her Urea is 150 mg/dl, and Creatinine is 2.5 mg/dl. An ultrasound of abdomen is requested and shows left and right kidneys of 9 cm in size without evidence of obstruction. Which one of the following is the best investigation to diagnose the cause of her renal failure?

- A. Isotope renography
- B. IV urography
- C. Renal angiography
- D. Renal biopsy
- E. Retrograde pyelography

The correct answer is D. This patient has impaired renal function, with hypertension and significant proteinuria and hematuria (? glomerulonephritis). The kidneys are smaller than expected, with no evidence of obstruction. Intravenous urography (Choice B) is not the investigation of choice in a patient with impaired renal function.

Isotope renography (Choice A) would provide information about the relative function of each kidney, and would show areas of scarring due to renal stone disease, infection, or vascular disease. It would also exclude congenital malformations of the kidneys.

Although useful, it would not provide information on the cause of the hematuria and proteinuria. Renal angiography (Choice C) is the gold standard for assessing renovascular disease. It is an invasive procedure, with potential complications. This investigation would not exclude causes of proteinuria and hematuria.

Retrograde pyelography (Choice E) would be useful if there were any evidence of obstruction. The best investigation is a renal biopsy. This would show any changes of glomerulonephritis, along with renal scarring from longstanding hypertension or urinary tract infections.

20. A 65-year-old man presents with renal colic. The following day he passes a stone in his urine with analysis revealing that it is composed of uric acid. Which one of the following is the most likely cause of this type of renal stone?

- A. Allopurinol
- B. Chronic renal failure
- C. Primary hyperparathyroidism
- D. Secondary polycythemia
- E. Thiazide diuretics

The correct answer is E. Uric acid stones; occur in 5-25% of all cases of nephrolithiasis. They are associated with hyperuricemia and hyperuricosuria. Predisposing factors for uric acid stone formation are dehydration, high purine load (high protein diet), as a primary factor in idiopathic gout, and associated with high cell turnover (e.g. hematological malignancy). Chronic renal failure (Choice B) is incorrect, as there is hyperuricemia without hyperuricosuria. Hyperparathyroidism (Choice C) is associated with calcium stones, not uric acid stones. Primary polycythemia would predispose to uric acid stone formation, whereas secondary polycythemia (Choice D)

does not. Allopurinol (Choice A) is prescribed to treat gout and prevents uric acid formation; hence it reduces the frequency of uric acid stones. The correct answer is Thiazide diuretics (Choice E). Thiazide diuretics cause hyperuricemia and can predispose to hyperuricosuria and uric acid stone formation. Uric acid stones are also associated with underlying hypertension. Thiazide diuretics are used to treat calcium stones, as they increase the reabsorption of calcium from the proximal tubules, preventing hypercalciuria.

21. A 30-year-old woman presented with hypertension (160/110 mmHg), elevated titres of antibodies to double-stranded DNA, and proteinuria (1 g per 24 hours). A renal biopsy demonstrated WHO class II lupus nephritis (mesangial disease). What is the most appropriate single treatment for this patient?

- A. Antihypertensive medication
- B. High-dose corticosteroids
- C. Intravenous cyclophosphamide
- D. Oral cyclophosphamide
- E. Plasma exchange

The correct answer is A. There is good evidence that immunosuppression could alter outcome in the presence of proliferative glomerulonephritis but not in mesangial or membranous glomerulonephritis. Therefore the best line of treatment would be a conservative approach to address risk factors for progression of renal impairment such as uncontrolled hypertension. There is no good evidence to support plasma exchange as an effective treatment modality in lupus nephritis.

22. A 45-year-old man had recurrent nephrolithiasis. Renal function tests and serum calcium measurements were normal. A 24 hour urine collection revealed:

Volume	3L
Calcium	15 mmol/24 hours (2.5-7.5)
Oxalate	200 mmol/24 hours (90-450)
Uric acid	3 mmol/24 hours (1.48-4.45)
Citrate	2 mmol/24 hours (0.3-3.4)

What is the most useful therapy to reduce stone formation?

- A. Allopurinol
- B. Dietary calcium restriction
- C. Penicillamine
- D. Potassium citrate
- E. Thiazide diuretic

The correct answer is E. This patient has hypercalciuria and Thiazide diuretics can decrease urinary excretion of calcium and possibly oxalate. Dietary calcium restriction will not limit calciuria, given the large amount of calcium that can be mobilized from bone. The lack of hyperuricosuria and hypocitraturia excludes the other treatments offered.

Nephrology (EMQs)

23. A 45-year-old lady presents with fatigue and has established End Stage Renal Failure. She has been on-hemodialysis for the past three years and receives dialysis for 3 hours three times a week at a regional hemodialysis centre. At one of her regular visits for hemodialysis she is found to have the following observations and investigations.

Blood pressure	170/95
Serum K ⁺	5.7 mEq/L
Serum corrected calcium	8 mg/dl
Hb	9.0 g/dL
Creatinine	10 mg/dl

Post-dialysis her Blood Pressure is recorded as 160/95. Which of the following is the best management for this lady?

- A. Increase dialysis hours
- B. Treat anaemia with erythropoietin
- C. Treat hyperkalemia
- D. Treat hypertension with ramipril
- E. Treat hypocalcaemia

The correct answer is B. This person's main complaints are of fatigue. Treating her with erythropoietin would therefore be the most appropriate therapy particularly with her anaemia. Increasing dialysis is unlikely to be acceptable to most patients and renal units though this is an option some patients would choose, especially those on 'home hemodialysis. Vascular disease is an important cause of death in dialysis patients and this lady may very well need additional treatment of blood pressure.

24. A 63-year-old male recently admitted with sepsis is noted to have a urine output of approximately 20 mL per hour. You suspect a prerenal cause. Which of the following confirms your diagnosis?

- A. A blood pressure of 150/90 and good tissue perfusion.
- B. A urine free of red blood cells or casts
- C. A urine: plasma urea ratio < 3
- D. Urinary sodium >10 mmol/l
- E. Urine osmolality < 350 mOsm/l

The correct answer is B. Oliguria defined as < 400ml urine/day. Red cell casts present in acute glomerulonephritis, renal vasculitis, accelerated hypertension and interstitial nephritis. Pre-renal failure is renal dysfunction due to hypoperfusion (urinary sodium < 20, urine osmolality >500, urine/plasma urea ratio > 8, and urine/plasma creatinine >40) and acute tubular necrosis is acute renal failure due to circulatory compromise and/or nephrotoxin (urinary sodium > 40, urine osmolality < 350, urine/plasma ratio < 3, and urine/plasma creatinine < 20).

Nephrology (MCQs)

25. A 21-year-old female presents with a joint pains and rash. On examination her blood pressure 150/90. Investigations revealed:

Creatinine	1.2 mg/dl
Anti ds DNA antibodies	Strongly positive
24 hour urinary protein excretion	1.7g (<0.2)
Renal biopsy	Membranous nephropathy

What is the most appropriate next treatment?

- A. ACE inhibitor for blood pressure control
- B. Cyclophosphamide
- C. NSAIDs for arthralgia
- D. Prednisolone for immunosuppression
- E. Warfarin anticoagulation

The correct answer is D. This patient has SLE, with disease affecting her kidneys. The biopsy has shown pure membranous nephropathy, classifying the disease as class V (a) on the 1995 WHO classification of lupus nephritis. Class V (a and b) have a low rate of progression to renal failure. There is no clear consensus on treatment, but most nephrologists would start treatment with prednisolone. Cyclophosphamide could be added in later as a steroid sparing agent. Warfarin is not considered an appropriate treatment, as if this lady exhibited any pro -thrombotic tendencies (on the background of antiphospholipid antibody disease) she should be started on aspirin. Non steroidal anti-inflammatory medication would treat her arthralgia, but would have no effect on the prognosis of the disease as there is a low rate of progression of renal disease in this patient.

26. A 45-year-old man presented to the Nephrology clinic with severe generalized edema. Investigations revealed:

Serum albumin	20 g/L
24 hour urinary protein excretion	14.6g
Renal biopsy	Normal on light microscopy, normal on immunofluorescence

What is the most likely diagnosis?

- A. Focal segmental glomerulosclerosis
- B. Membranous nephropathy
- C. Minimal change disease
- D. Myeloma
- E. Renal vein thrombosis.

The correct answer is C. This patient has symptoms and signs of a nephrotic syndrome. A renal biopsy was normal on light microscopy and immunofluorescence. Focal segmental glomerulosclerosis and membranous nephropathy are all histological diagnoses. As this patients' renal biopsy was normal, he cannot have these diagnoses. Myeloma generally causes a cast nephropathy, but can also cause Fanconi syndrome,

light chain amyloidosis, and light chain deposition, infiltration of renal interstitium by plasma cells, calcium precipitation and renal infection. This may cause acute renal failure, chronic renal failure or nephrotic syndrome. All the above lesions should be visible on light microscopy of the renal biopsy.

Renal vein thrombosis is an uncommon cause of the nephrotic syndrome. It is not normally associated with such heavy proteinuria and, if it is, there are usually changes seen on microscopy.

The likely diagnosis is minimal change nephropathy. Although it is more common in children it does occur in adults and is then associated with poorer outcomes. As well as heavy proteinuria oval fat bodies may also be seen in the urine.

27. An 18-year-old female student attends the clinic as her father has just died with end-stage renal failure. He had been diagnosed with autosomal dominant polycystic kidney disease. She wishes to know what investigations she requires. **Which of the followings an appropriate strategy in her management?**

- A. Genetics referral
- B. Glomerular Filtration Rate Estimation
- C. MRI brain
- D. Ultrasound of the renal tract
- E. Urine Dipstick

The correct answer is A. An ultrasound of the renal tract may not be appropriate at this patients' age, given that cysts may not become apparent until the age of 20. Gross hematuria in ADPKD carries a poor prognosis; however microscopic hematuria may be a complication. Subarachnoid hemorrhage may be a cause of mortality in 9% of patients with ADPKD, though 8% of patients have an asymptomatic intracranial aneurysm, and if the diagnosis is confirmed and there is a strong history of Subarachnoid Hemorrhage then an MRI would be indicated. Genetic counselling is most appropriate in this context and genetic linkage analysis may be utilized.

Extended Matched Questions (EMQ)

1. Renal impairment

- | | |
|---------------------------------|--------------------------------------|
| A. Acute interstitial nephritis | G. Medullary sponge kidney |
| B. Bartter's syndrome | H. Minimal change glomerulonephritis |
| C. Cystinuria | I. Renal artery stenosis |
| D. Diabetic nephropathy | J. Renal tubular acidosis |
| E. Idiopathic hypercalciuria | K. Renal vein thrombosis |
| F. Lupus nephritis | |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 19-year-old mechanic was started on flucloxacillin for an infected wound. Blood tests done 3 days later showed evidence of renal failure. Urine was positive for blood and protein. Abdominal ultrasonography showed normal kidneys with no evidence of obstruction.
2. A 35-year-old woman presents with a blood pressure of 190/110 mmHg and impaired renal function. Urine microscopy showed scanty red cells and granular casts. Renal biopsy showed linear IgG on glomerular basement membrane.
3. A 40-year-old man presents with renal colic. He had had several similar episodes in the past which were sometimes associated with passing small stones. Abdominal radiography showed calcified opacities in both kidneys. All blood and urinary tests were normal.
4. A previously fit 17-year-old porter presents with renal colic. On examination his left flank was tender. Blood tests were normal. Urine microscopy showed hexagonal crystals. Intravenous pyelography (IVP) showed faintly opaque staghorn calculus in the left renal pelvis.
5. A 66-year-old diabetic woman was investigated for hyperkalemia. She was on indomethacin and glibenclamide. Blood tests showed evidence of renal impairment, hyperkalemia and hyperchloremia.

Answers: A F G C J

1. A 19-year-old mechanic was started on flucloxacillin for an infected wound. Blood tests done 3 days later showed evidence of renal failure. Urine was positive for blood and protein. Abdominal ultrasonography showed normal kidneys with no evidence of obstruction.

Answer is A: Interstitial nephritis is usually due to infection or reaction to medication. When caused by an allergic reaction, the symptoms of acute tubulointerstitial nephritis are fever, rash and enlarged kidneys. Some patients experience dysuria and lower back pain.

2. A 35-year-old woman presents with a blood pressure of 190/110 mmHg and impaired renal function. Urine microscopy showed scanty red cells and granular casts. Renal biopsy showed linear IgG on glomerular basement membrane.

Answer is F: Most patients with systemic lupus erythematosus (SLE) develop lupus nephritis early in their disease course. SLE is more common among women in the third decade of life, and lupus nephritis typically occurs in patients aged 20-40 years. Symptoms related to active nephritis may include peripheral edema secondary to hypertension or hypoalbuminemia. Laboratory abnormalities such as elevated serum creatinine levels, low albumin levels or urinary protein or sediment suggest active lupus nephritis.

3. A 40-year-old man presents with renal colic. He had had several similar episodes in the past which were sometimes associated with passing small stones. Abdominal radiography showed calcified opacities in both kidneys. All blood and urinary tests were normal.

Answer is G: Medullary sponge kidney is a congenital disorder that can affect one or both kidneys, or only part of one kidney. There are ectatic and cystic changes of the medullary and papillary collecting ducts. Although it is a congenital disorder, diagnosis is often not made until the second or third decades, and it may be asymptomatic. Hematuria is common and usually microscopic, although macroscopic hematuria can occur with associated infection or calculi. Renal calculi may occur and are usually calcium oxalate and calcium phosphate. Recurrent urinary tract infection is a common presentation and affects more women than men. There may also be sterile pyuria.

4. A previously fit 17-year-old porter presents with renal colic. On examination his left flank was tender. Blood tests were normal. Urine microscopy showed hexagonal crystals. Intravenous pyelography (IVP) showed faintly opaque staghorn calculus in the left renal pelvis.

Answer is C: Cystinuria is an inherited autosomal recessive metabolic disorder that is characterized by the formation of cystine stones in the kidneys, ureter and bladder. Cystine stones are common in the second or third decade of life. The peak age of first renal calculus is 22 years.

5. A 66-year-old diabetic woman was investigated for hyperkalemia. She was on indomethacin and glibenclamide. Blood tests showed evidence of renal impairment, hyperkalemia and hyperchloremia.

Answer is J: In RTA, an accumulation of acid in the body occurs due to a failure of the kidneys to appropriately acidify the urine. The metabolic acidosis that results from RTA may be caused either by failure to recover sufficient bicarbonate ions from the filtrate in the proximal tubule or by insufficient secretion of hydrogen ions into the distal tubule.

2. Renal Calculi

- | | |
|---|--|
| A. Acid diuresis | F. Nephrectomy |
| B. Alkaline diuresis | G. Percutaneous nephrolithotomy (PCNL) |
| C. Expectant management | H. Percutaneous nephrostomy |
| D. Extracorporeal shock wave lithotripsy (ESWL) | I. Peritoneal dialysis |
| E. Intravenous antibiotics | |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 30-year-old pregnant woman (26 weeks) presents with septicemia and abdominal pain. Investigations reveal an obstructed right kidney due to a 2-cm calculus. She is commenced on intravenous antibiotics. ☐
2. A 40-year-old man presents with left-side renal colic. Intravenous urography (IVU) shows a 1-cm calculus in the upper third of the ureter. There is no complete obstruction. His symptoms fail to resolve on conservative management. ☐
3. A 20-year-old man presents with renal colic secondary to a 1-cm cystine calculus. ☐
4. A 30-year-old man presents to ER with right-side renal colic. IVU shows a 4-mm calculus in the distal part of the ureter with no complete obstruction. ☐
5. A 40-year-old woman is found to have a staghorn calculus in a nonfunctioning kidney. ☐

Answers: H D B C F

1. A 30-year-old pregnant woman (26 weeks) presents with septicemia and abdominal pain. Investigations reveal an obstructed right kidney due to a 2-cm calculus. She is commenced on intravenous antibiotics.

Answer is H: A nephrostomy is performed whenever a blockage keeps urine from passing from the kidneys, through the ureter and into the urinary bladder. Pregnancy is a relative contraindication for ESWL and PCNL.

2. A 40-year-old man presents with left-side renal colic. Intravenous urography (IVU) shows a 1-cm calculus in the upper third of the ureter. There is no complete obstruction. His symptoms fail to resolve on conservative management.

Answer is D: ESWL is the non-invasive treatment of kidney stones and biliary stones using an acoustic pulse. It works best with stones between 4 mm and 2 cm in diameter that are still located in the kidney. It can also be used to break up stones which are located in a ureter, but with less success.

3. A 20-year-old man presents with renal colic secondary to a 1-cm cystine calculus.

Answer is B: Increased urinary dilution (from forced hydration) and strong urinary alkalization (from oral alkalizing agents) are two of the most effective methods for the treatment and prevention of cystine kidney stones. Urinary alkalization works by increasing the solubility of urinary cystine.

4. A 30-year-old man presents to ER with right-side renal colic. IVU shows a 4-mm calculus in the distal part of the ureter with no complete obstruction.

Answer is C: In this clinical scenario, there is a possibility that the patient may pass the stone spontaneously.

5. A 40-year-old woman is found to have a staghorn calculus in a nonfunctioning kidney.

Answer is F: Staghorn calculi refer to branched stones that fill all or part of the renal pelvis and branch into several or all of the calyces. They are most often composed of struvite (magnesium ammonium phosphate) and/or calcium carbonate apatite. These stones are often referred to as 'infection stones' since they are strongly associated with urinary tract infections with urea splitting organisms. Thus, most patients require definitive surgical treatment.

Short Heading Questions (SHQs)

1. All are recognized causes of chronic renal failure (CRF) EXCEPT:

☒ A. Snake bite
☐ B. Malignant hypertension
☐ C. Diabetes mellitus
☐ D. Obstructive uropathy
☐ E. Analgesic abuse

2. All are true in acute renal failure (ARF) EXCEPT:

☐ A. \uparrow Normal Urea
☐ B. \uparrow Normal H^+ concentration
☒ C. \uparrow Normal $Ca^{++} \rightarrow$ End stage \downarrow
☐ D. \uparrow Normal K^+
☐ E. Low Na^+

3. Broad casts are found in:

☐ A. Acute glomerulonephritis
☐ B. Urinary tract infection
☐ C. Analgesic nephropathy
☒ D. Chronic renal failure (CRF)
☐ E. Obstructive uropathy

4. Which is not a criterion for diagnosis of nephrotic syndrome?

☒ A. Hypertension
☐ B. Massive proteinuria
☐ C. Hyperlipidemia
☐ D. Anasarca
☐ E. Hypoalbuminemia

5. Oliguria is:

☐ A. < 50 mL urine/24 hrs
☐ B. < 100 mL urine/24 hrs
☐ C. < 200 mL urine/24 hrs
☒ D. < 400 mL urine/24 hrs
☐ E. < 600 mL urine/24 hrs

6. Fatty cast is often diagnostic of:

☒ A. Nephrotic syndrome \rightarrow Hypercholesterolemia
☐ B. Acute glomerulonephritis
☐ C. End-stage renal disease
☐ D. Papillary necrosis
☐ E. Hyperlipidemia

7. Which is not a neuromuscular complication of uratemia:

- A. Encephalopathy
- ☒ B. Myelopathy
- C. Neuropathy
- D. Myopathy
- E. Myoclonus

8. 'Complete' anuria is found in:

- ☒ A. Diffuse cortical necrosis
- B. Acute gastroenteritis
- C. Acute renal failure
- D. Chronic glomerulonephritis
- E. Acute interstitial nephritis

9. Which is not a recognized cause of microalbuminuria:

- ☒ A. Nephrotic syndrome
- B. Diabetes mellitus with early renal involvement
- C. Congestive cardiac failure
- D. Strenuous physical exercise
- E. Fever

10. Which of the following does not produce red urine:

- A. Hemoglobinuria
- B. Myoglobinuria
- ☒ C. Microscopic hematuria
- D. Acute intermittent porphyria

11. Polyuria is produced by all of the following EXCEPT:

- A. Diabetes insipidus
- ☒ B. Congestive cardiac failure
- C. Hypercalcemic nephropathy
- D. Chronic renal failure
- E. High protein tube feeding

12. Which metal is not responsible for development of nephrotic syndrome:

- A. Gold
- ☒ B. Iron
- C. Mercury
- D. Lead
- E. Chromium

13. Commonest renal lesion in diabetic nephropathy is:

- ☒ A. Diffuse glomerulosclerosis
- B. Chronic interstitial nephritis
- C. Arterio nephrosclerosis
- D. Nodular glomerulosclerosis
- E. Papillary necrosis

14. Absolute indication for dialysis:

- A. Serum K⁺ level > 6 mEq/L
- B. Serum urea level > 200 mg/dL
- C. Serum creatinine level > 4 mg/dL
- ☒ D. Clinical evidence of pericarditis → Endstage
- E. HCO₃ level < 10 mEq/dL

15. Serum urea and creatinine remain normal in:

- A. Hepato-renal syndrome
- B. Hemolytic-uremic syndrome
- ☒ C. Hydronephrosis → حصى الكلى
- D. Acute renal failure
- E. Lipoid nephrosis

16. Blood level of all rises in ARF EXCEPT:

- A. Uric acid
- B. K⁺
- ☒ C. Na⁺
- D. Creatinine
- E. Phosphate

17. Prognosis of which of the following is excellent:

- ☒ A. Acute glomerulonephritis
- B. Interstitial nephritis
- C. Chronic nephritis
- D. Nephrotic syndrome
- E. Diabetic nephropathy

18. Recognized feature of minimal change glomerular disease is:

- A. Hematuria
- B. Hypertension
- C. Absence of edema
- D. Response to corticosteroid
- ☒ E. Decreased complement

Answer key:

- 1- A
- 2- C
- 3- D
- 4- A
- 5- D
- 6- A
- 7- B
- 8- A
- 9- A
- 10- C
- 11- B
- 12- B
- 13- A
- 14- D
- 15- C
- 16- C
- 17- A
- 18- D

HEMATOLOGY**Multiple Choice Questions (MCQs)**

1. A 27-year-old man presents with jaundice. His recent history is significant for a chest infection for which he is taking trimethoprim sulfamethoxazole; on examination, the sclera is icteric and the mucosa beneath the tongue appears yellow. No hepatosplenomegaly is present. Laboratory studies are as follows: Hemoglobin 11.1 g/dL, Hematocrit 34%, Total bilirubin 6.2 mg/dL, Conjugated (direct) bilirubin 0.8 mg/dL, Alkaline phosphatase 77, AST 24, ALT 22. Which of the following is the most likely explanation for this patient's jaundice?

- A. Acute infectious hepatitis
- B. Cholestatic liver disease
- C. Drug reaction from trimethoprim-sulfamethoxazole
- D. Gall bladder stones.
- E. Glucose-6-phosphate dehydrogenase deficiency

The correct answer is E. This man has glucose-6-phosphate dehydrogenase (G6PD) deficiency. G6PD serves to protect the RBCs from oxidative damage by maintaining high intracellular levels of NADPH. Common oxidative stressors that initiate hemolysis are drug reactions (especially sulfa drugs), febrile illnesses, and Fava bean ingestion.

2. A 72-year-old man complains of malaise and easy fatigability for the past 3 weeks. His past medical history is significant for gout and pneumonia. He lives alone and usually drinks two- six-bottles of beer daily. His temperature is 36.9°C, blood pressure is 160/90 mm Hg, pulse is 88/min, and respirations are 19/min. Thyroid palpation is normal, and heart, lung, and abdomen examination results are within normal limits. There is a diffuse ecchymotic rash spreading out from hair follicles on the limbs and trunk. The patient most likely has a deficiency of which of the following vitamins?

- A. Niacin
- B. Thiamin
- C. Vitamin B12
- D. Vitamin C
- E. Vitamin D

The correct answer is D. This question examines the different aspects of vitamin deficiencies. Scurvy is a deficiency of vitamin C that may occur in older men who cook for themselves. The features are perifollicular hemorrhage and purpura, splinter hemorrhages, and gum involvement. Normochromic, normocytic anemia is common. Niacin deficiency (choice A), known as pellagra, is a chronic wasting disease associated with dermatitis, dementia, and diarrhea. The skin lesions are characterized by hyperkeratosis, hyperpigmentation, and desquamation. The course is progressive over several years. Niacin is found in cereals. Vitamin B1 (thiamine) deficiency (choice B), known as beriberi, occurs in alcoholics. Two manifestations of deficiency include cardiovascular disease (high output failure) and neurologic disorders. Vitamin B12 deficiency (choice C) causes a macrocytic anemia. Patients may complain of a sore

Hematology (MCQs)

tongue or weight loss. Neurologic manifestations include weakness and ataxia from demyelination. Vitamin D deficiency (**choice E**) causes disorders of bone mineralization, namely rickets in children and osteomalacia in adults.

3. A 61-year-old man presents for an elective surgical procedure. The patient has an 8-year history of hepatitis C infection with well-documented cirrhosis and portal hypertension. He has a large hematoma on his thigh that is suspected to have necrotic tissue underlying it and therefore requires debridement. On preoperative screening, his prothrombin time is noted to be 17.4 seconds. **Transfusion of which of the following is the most appropriate next step in management of this patient prior to his procedure?**

- A. Cryoprecipitate
- B. Fresh frozen plasma
- C. Packed red blood cells
- D. Platelets
- E. Whole blood

The correct answer is B. A basic understanding of blood product and blood component replacement is crucial. The use of such products is extremely common, and there is misuse. Patients with liver disease have a deficiency of one or more clotting factors produced by the liver. A blood product that specifically raises such factors is indicated for treatment. Fresh frozen plasma (FFP) generally increases plasma anticoagulation factors by 30%. Like all blood products, it is type specific. There is a correlation for prothrombin times greater than 15 and the risk of bleeding with invasive procedures such as paracentesis. For this reason, FFP is usually indicated in such patients prior to undergoing their procedure.

4. A 30-year-old man is recovering from abdominal trauma and now develops multiple bruises all over his body. He has completed a 2-week course of antibiotics and has also been receiving nutrition parenterally for 21 days. He is otherwise healthy and has never been on medications prior to this admission. On physical examination, his vital signs are stable. He has multiple ecchymosis on his abdomen. The heart is regular in rate and rhythm. His prothrombin time is elevated. His platelet count is decreased. **Which of the following is the most likely cause of his easy bruising?**

- A. Calcium deficiency
- B. Disseminated intravascular coagulation
- C. Magnesium deficiency
- D. Sepsis
- E. Vitamin K deficiency

The correct answer is B. Disseminated intravascular coagulation (DIC) can lead to a coagulopathy as a result of the consumption of coagulation factors

Hematology (MCQs)

5. A 22-year-old woman feels fatigue. Physical examination demonstrates waxy pallor of her skin and mucous membranes. She also has purpura on her extremities that she attributes to minor trauma, such as hitting her hand accidentally on a drawer. Blood studies are performed, demonstrating a red cell count of 1.5 million/dL, white count of 1300/dL (80% lymphocytes), and platelet count of 40,000/dL. Reticulocytes are absent. All blood cells seen have normal morphology. Bone marrow biopsies obtained from the hips bilaterally show predominately fat, with markedly diminished precursors in all blood cell lines. **Which of the following is the most likely diagnosis?**

- A. Aplastic anemia
- B. Folate deficiency anemia
- C. Iron deficiency anemia
- D. Myelophthisic anemia
- E. Vitamin B 12 deficiency anemia

The correct answer is A. This patient has aplastic anemia. A characteristic feature of this condition is that the growth of erythrocyte precursors, granulocyte precursors, and megakaryocyte precursors is markedly impaired. The marrow is usually replaced by adipose tissue; Aplastic anemia typically develops insidiously, but may have a more rapid course. In about half of cases, no cause is ever identified. In the remainder, causes may include chemical exposures (e.g., benzene and inorganic arsenic), radiation, or drug reactions (e.g., antineoplastic agents, antibiotics, anticonvulsants, and nonsteroidal anti-inflammatory drugs), and parvovirus B19 in patients with hemoglobinopathies or spherocytosis. Historically, the condition has required marrow transplantation, but this therapy is now reserved for patients who fail to improve with equine antithymocyte globulin or cyclosporine therapy.

6. A 19-year-old woman is evaluated because of a 6-week history of intermittent low-grade fever, weight loss, and night sweats. On physical examination she is found to have enlarged lymph nodes on both jugular chains and supraclavicular areas, and chest CT scan shows a large mediastinal mass. One of the most accessible cervical nodes is excised surgically for biopsy; the pathologist reports the presence of Reed-Sternberg cells. Abdominal CT scan is non diagnostic and bone marrow biopsy is positive. **Which of the following is the most appropriate next step in management?**

- A. Bilateral neck dissections and surgical mediastinal exploration
- B. Bone marrow transplant
- C. Radiation therapy to the affected areas
- D. Staging laparotomy
- E. Systemic chemotherapy

The correct answer is E. We already know that this woman has Hodgkin lymphoma with disease in her cervical nodes, mediastinum, and bone marrow (stage IV). The standard initial treatment for her is chemotherapy. Surgical excision of affected nodes (**choice A**) is not indicated for Hodgkin lymphoma. The role of the surgeon in this disease is limited to diagnosis.

7. A 30-year-old woman complains of fatigue and dyspnea for the past 2 months. She reports that she has also lost 7 Kg during this time. She has been previously healthy and is not taking any medications. She is pale and thin and has a flow murmur on her cardiac examination. She also has mildly enlarged supraclavicular lymph nodes. Laboratory results are notable for a hematocrit of 30%, mean corpuscular volume (MCV) of 78, decreased total iron binding capacity (TIBC), and increased ferritin. A screening erythrocyte protoporphyrin level is <35 and a blood smear shows microcytic red cells. **Which of the following is the most likely diagnosis?**

- A. Anemia of chronic disease
- B. Aplastic anemia
- C. Lead poisoning
- D. Pyridoxine deficiency
- E. Spherocytosis

The correct answer is A. This is anemia of chronic disease. In contrast to iron deficiency anemia, the TIBC is decreased, but ferritin is increased. The microcytosis is the same as in iron deficiency. This patient may have an infection or an occult malignancy and needs further workup for the loss of weight. Aplastic anemia (**choice B**) can be the result of exposure to drugs, such as chloramphenicol, that can lead to the suppression of erythrocyte production. A low reticulocyte count, which is an indication of immature red cells, can be helpful in diagnosis of this illness. Bone marrow biopsy may show hypocellularity of the marrow.

Lead poisoning (**choice C**) occurs following the inhalation of lead dust or fumes or following the ingestion of lead. Presentation in these patients ranges from abdominal discomfort, myalgia, headache, and weight loss to peripheral neuropathy and encephalopathy. Laboratory studies show a normal serum iron, a normal TIBC, and basophilic stippling on peripheral blood smear. A screening erythrocyte protoporphyrin level is >35 g/dl, indicating the need for blood lead testing.

Pyridoxine is a cofactor in the manufacture of Porphyrins, which are needed in the manufacture of hemoglobin. Therefore, pyridoxine deficiency (**choice D**) may cause a microcytic hypochromic anemia, but the laboratory panel above is characteristic of anemia of chronic disease.

Hereditary spherocytosis (**choice E**) is a genetic defect arising from mutations in red cell cytoskeletal proteins. This leads to a cell wall defect, which in turn leads to removal of excess cell wall in the spleen. Surface tension causes these cells to become spheres.

8. A previously healthy, 48-year-old woman presents with easy fatigability, anorexia, and a 5-kg weight loss for 2 months. She also reports night sweats and occasional temperatures to 38°C . On examination, the spleen is palpable 4 cm below the left costal arch. Blood tests reveal hemoglobin of 16 g/dL, 500,000 platelets/ mm^3 , and 170,000 leukocytes/ mm^3 . The differential count shows a left shift, with predominance of mature granulocytes, bands, and metamyelocyte; blasts are 3%. Serum chemistry is remarkable for low leukocyte alkaline phosphatase and high uric acid. Cytogenetic studies demonstrate the presence of the Philadelphia chromosome in white blood cells. **Which of the following is the most likely diagnosis?**

- A. Acute myelogenous leukemia (AML)
- B. Chronic lymphocytic leukemia (CLL)
- C. Chronic myelogenous leukemia (CML)
- D. Leukemoid reaction
- E. Myelofibrosis

The correct answer is C. Chronic myelogenous leukemia (CML) is a myeloproliferative disorder developing from neoplastic transformation of a bone marrow stem cell that still retains the capacity to differentiate along erythrocytic, megakaryocytic, granulocytic, or monocytic lines. Thus, the peripheral blood in CML is characterized by striking leukocytosis, with myeloid cells present at different degrees of differentiation and in direct proportion to their degree of maturation. Therefore, immature cells—blasts and promyelocyte—are less numerous than mature granulocytes or monocytes. Blasts are usually less than 5%. CML is characterized by the presence of the Philadelphia chromosome, arising from a balanced translocation involving 9q and 22q. The presence of the Philadelphia chromosome is definitive evidence for CML. Acute myelogenous leukemia (AML) (**choice A**) results from neoplastic transformation of a stem cell that has lost the capacity to differentiate fully into mature blood cells. Thus, large numbers of blasts are present in peripheral blood and bone marrow. The Philadelphia chromosome is absent in most cases. Chronic lymphocytic leukemia (CLL) (**choice B**) and its lymphomatous counterpart—small lymphocytic lymphoma—derive from neoplastic proliferation of small, well differentiated lymphocytes. CLL is associated with marked lymphocytosis (up to 200,000/ mm^3) in peripheral blood. Patients present with fatigue and lymphadenopathy, but often lymphocytosis is discovered incidentally.

A Leukemoid reaction (**choice D**) is an exuberant form of leukocytosis (with leukocyte counts up to 50,000/ mm^3) that may follow infections. Sometimes it is difficult to distinguish between true leukemia and a Leukemoid reaction, but presence of the Philadelphia chromosome rules out the latter. Leukocyte alkaline phosphatase is elevated in Leukemoid reaction, low in CML.

Myelofibrosis (**choice E**) is a chronic myeloproliferative disorder characterized by marrow fibrosis and widespread extramedullary hematopoiesis, resulting in massive splenomegaly. The Philadelphia chromosome is absent. Teardrop erythrocytes are characteristically present in peripheral blood smears.

Hematology (MCQs)

9. A 45-year-old woman presents with chronic fatigue. A review of systems reveals long-standing stomach problems characterized by slow digestion and delayed emptying of her stomach. A complete blood count demonstrates a moderately severe megaloblastic anemia. Serum vitamin B12 level is 85 pg/mL; serum folate is 3 ng/mL; and serum iron is 105 mg/dL. Autoantibodies to intrinsic factor are detected in the serum. A biopsy of the stomach is most likely to show which of the following?

- A. Acute erosive gastritis
- B. Gastric atrophy
- C. Linitis plastica
- D. Ménétrier's disease
- E. Peptic ulcer

The correct answer is B. The patient has pernicious anemia, in which gastric atrophy is associated with megaloblastic anemia due to vitamin B12 deficiency.

10. A 40-year-old woman presents with a rash on her legs for the past 4 days. She recalls a recent respiratory infection. On examination, there is a small amount of blood in her nostrils. There are several hemorrhagic bullae in her oral cavity. Her lungs are clear, cardiac examination is unremarkable, and her abdomen is soft with no palpable spleen or liver. Both lower extremities have multiple dark blue ecchymoses. Laboratory analysis reveals:

Leukocyte count: 9000/mm³

Hemoglobin: 10.1 g/dL

Platelets: 9000/mm³

Peripheral smear: Reticulocytosis with normal erythrocytes and megathrombocyte. An ultrasound examination is negative for masses or fluid collections. Which of the following is the most appropriate next step in management?

- A. Cryoprecipitate
- B. Immunoglobulins
- C. Plasmapheresis
- D. Prednisone
- E. Splenectomy

The correct answer is D. This woman most likely has idiopathic thrombocytopenic purpura (ITP). ITP is most common in adults (women>men) aged 20-40 years. Bleeding, epistaxis, oral bleeding, or menorrhagia can occur, and isolated thrombocytopenia (<10,000) is characteristic. Ten percent of patients will have coexistent autoimmune hemolytic anemia (note the Reticulocytosis and anemia). The first-line therapy is prednisone if the patient is not actively bleeding. Patients who are bleeding may require IV immunoglobulin (choice B) to block phagocytic activity

Hematology (MCQs)

11. A 38-year-old man is admitted to the hospital after sustaining a pulmonary embolism. The patient has a past medical history significant for two idiopathic deep venous thromboses and takes only aspirin daily. Three hours ago, he developed acute shortness of breath, pleuritic chest pain, and palpitations. He was taken by ambulance to the hospital. In the emergency department, he was diagnosed with a pulmonary embolus on the basis of clinical signs and symptoms and a ventilation-perfusion scan. He was started on IV unfractionated heparin at that time. Which of the following laboratory tests would be most appropriate to guide therapy with this drug?

- A. Bleeding time
- B. Factor Xa levels
- C. Partial thromboplastin time (PTT)
- D. Platelet count
- E. Prothrombin time (PT)

The correct answer is C. The dose of traditional unfractionated heparin required for anticoagulation can be determined by following the partial thromboplastin time (PTT). Heparin prolongs the PTT.

12. A 60-year-old man complains of easy fatigability and palpitations for the past 6 months. Physical examination is remarkable for pallor of skin and mucous membranes. No evidence of cardiac or respiratory disease is found. Hematologic studies show:
Hemoglobin 8.4 g/dL, Mean corpuscular volume (MCV) 75 fL,
Leukocyte count 9000/mm³, Platelet count 380,000/mm³
Serum chemistry studies show a ferritin of 25 (N: 30-400 ng/mL) and serum bilirubin within normal values. Peripheral blood smear shows small erythrocytes with marked variability in size. Which of the following is the most appropriate next step in management?

- A. Bone marrow biopsy
- B. Coombs test for anti-red blood cell antibodies
- C. Hemoglobin electrophoresis
- D. Test for occult blood in the stool
- E. Therapeutic trial with oral ferrous sulfate

The correct answer is D. Microcytic anemia with low ferritin levels is characteristically due to iron deficiency. Low serum ferritin indicates depletion of body iron stores. Transferrin saturation falls below 15%. Severe iron deficiency will result not only in reduced mean corpuscular volume (MCV) of red blood cells, but also in variability in their size (anisocytosis) and shape (poikilocytosis). Iron-deficiency anemia is often accompanied by a high platelet count. In industrialized countries, iron-deficiency anemia should be assumed to result from chronic blood loss. The most important step in management is to identify the source of bleeding. In men, gastrointestinal hemorrhage is the most common underlying cause of iron-deficiency anemia. Thus, a test for occult blood in the stool is the initial screening study in this situation. Proper investigations must then be carried out to disclose the source of bleeding, which may be due to such conditions as peptic ulcer, gastritis, or colon cancer.

13. A 25-year-old schizophrenic patient presents with painful oral ulcers. He was started on chlorpromazine treatment 3 months ago. He is currently afebrile, and there is no evidence of significant somatic disease on physical examination. Blood analyses show: Hematocrit 45%, Platelet count $320,000/\text{mm}^3$, Leukocyte counts $400/\text{mm}^3$, Differential: Lymphocytes 85%, Monocytes 10%, and Neutrophils 5%. Morphology of red and white blood cells is normal on peripheral blood smears. Which of the following is the most appropriate next step in management?

- A. Admit patient for broad spectrum antibiotic treatment
- B. Discontinue drugs and give myeloid growth factors
- C. Perform bone marrow aspirate examination
- D. Treat stomatitis by topical corticosteroids
- E. Treat with erythropoietin

The correct answer is B. This patient presents with clinical manifestations consistent with drug-induced neutropenia. Neutropenia is defined as a blood cell count lower than $1500/\text{mm}^3$. Neutropenic patients are susceptible to bacterial and fungal infections. Drugs that may cause neutropenia include chlorpromazine, sulfonamides, procainamide, methimazole, propylthiouracil, penicillins, cephalosporins, and multiple chemotherapeutic agents. Clinical severity may vary considerably in relation to the degree of neutropenia. Sore throat and oral ulcers (stomatitis) are the mildest signs, but life-threatening infections may be the presenting manifestations if signs of infection are absent, the patient may be followed on an outpatient basis, and, of course, suspected drugs should be immediately discontinued. In severe cases myeloid growth factors may be used to hasten recovery.

14. A 34-year-old lady presented with tiredness and lethargy. Her full blood count shows:

Hemoglobin	10.3 g/dL
Platelet count	$320 \times 10^9/\text{L}$
White Cell Count	$10.6 \times 10^9/\text{L}$
MCV	68 fL
HbA2	5.2% (2-3)

Which of the following is the most likely diagnosis?

- A. Acute myeloid leukaemia
- B. Beta-thalassemia major
- C. Beta-thalassemia trait
- D. Hereditary spherocytosis
- E. Sickle cell disease

Correct answer is C. Microcytic anaemia would immediately raise the suspicion of iron deficiency perhaps from GI or menstrual blood loss. However, the MCV here is disproportionately low. This combined with a raised HbA2 makes the diagnosis of beta-thalassemia trait the most likely diagnosis. "The diagnosis of beta thalassemia minor usually is suggested by the presence of an isolated, mild microcytic anemia, target cells on the peripheral blood smear, and a normal red blood cell count. An elevation of Hb A2 (2 alp ha-globin chains Complexed with 2 delta-globin chains) demonstrated by electrophoresis or column

chromatography confirms the diagnosis of beta thalassemia trait. The Hb A2 level in these patients usually is approximately 4-6%. In rare cases of concurrent severe iron deficiency, the increased Hb A2 level may not be observed, although it becomes evident with iron repletion. The increased Hb A2 level also is not observed in patients with the rare delta-beta thalassemia trait."

15. A 22-year-old male student is admitted with weakness and tiredness. He has otherwise been well. Examination reveals a petechial rash on the lower legs and conjunctival pallor. He takes no medication and denies any illicit drug use. Investigations revealed:

Hemoglobin	4 g/dL
White cell count	$1 \times 10^9/\text{L}$
Platelets	$20 \times 10^9/\text{L}$
Clotting profile	Normal
Liver function tests	Normal

Which of the following is the likely diagnosis?

- A. Acute lymphocytic leukemia
- B. Acute myeloid leukemia
- C. Aplastic anaemia
- D. Henoch-Schonlein Purpura
- E. Hodgkin's lymphoma

Correct answer is C. This patient appears to have complete suppression of all his marrow components suggesting aplastic anaemia. The acquired condition may be associated with drug therapy such as cytotoxics, Chloramphenicol, infections such as viral hepatitis, ionizing radiation and chemicals.

16. A 67-year-old woman presents with acute severe back pain. She is normally fit and well, but there is a strong family history of osteoporosis.

Hb	10.6 g/dl
MCV	85
Calcium	13 mg/dl
Phosphate	6.5mg/dl
Alkaline phosphatase	126 IU/l (50-150)
Total protein	76g/l
Albumin	30g/l

What is the most likely underlying diagnosis?

- A. Metastatic disease
- B. Multiple myeloma
- C. Osteoporosis
- D. Paget's disease
- E. Sarcoidosis

Correct answer is B. This patient has hypercalcemia / hyperphosphatemia and hyperglobulinemia (The globulin level is raised at $46/\text{g}$ total protein - albumin = 46. A

Normal level should be below 36g/l). This together with normocytic anaemia and probable vertebral collapse would be highly suggestive of multiple myeloma. She needs serum immunoelectrophoresis, urinary Bence-Jones protein and bone marrow biopsy. The hyperphosphatemia in multiple myeloma is due to reduced renal excretion which may be directly due to renal impairment or interference with excessive protein load.

17. A 68-year-old man complained of tiredness and lethargy. On examination there was 2 cm hepatomegaly and 7 cm splenomegaly. Investigations showed:

Hemoglobin	17.4 g/dL
White cell count	$39.4 \times 10^9/L$
White cell differential :	
Neutrophils	$22.2 \times 10^9/L$
Lymphocytes	$1.1 \times 10^9/L$
Monocytes	$1.0 \times 10^9/L$
Eosinophils	$0.4 \times 10^9/L$
Basophils	$2.1 \times 10^9/L$
Metamyelocyte	$1.2 \times 10^9/L$
Myelocyte	$1.09 \times 10^9/L$
Myeloblast	$1.3 \times 10^9/L$
Nucleated RBC	3 per 100 rbc
Platelet count	$585 \times 10^9/L$

What is the most likely diagnosis?

- A. Acute myeloid leukemia
- B. Chronic myeloid leukemia
- C. Essential thrombocythemia
- D. Myelofibrosis
- E. Primary proliferative polycythemia (rubra vera)

Correct answer is B. The presentation is typical with vague symptoms of malaise and splenomegaly. The blood film also shows the typical high White Cell Count and there are all stages of myeloid cell maturation present in the peripheral blood with the metamyelocyte suggesting CML. Thrombocythemia is also seen in CML.

18. A 73-year-old man presented with a two week history of breathlessness and easy bruising. Investigations showed:

Hemoglobin	6.9 g/dL
White cell count	$0.4 \times 10^9/L$
Platelet count	$9 \times 10^9/L$
Bone marrow aspirate:	all cellular elements reduced.

Which drug is the most likely cause of these abnormalities?

- A. Acyclovir
- B. Amiloride
- C. Amoxicillin
- D. Paracetamol
- E. Trimethoprim

Correct answer is E. There is a pancytopenia and marrow aspirate shows reduction in production of all cellular elements. Trimethoprim is the drug most likely of these 5 to cause depression of hematopoiesis as this picture would be particularly unusual with paracetamol, amiloride acyclovir and amoxicillin.

19. A 56-year-old man is found to have a macrocytic anaemia with a megaloblastic bone marrow. Which of the following is the most likely cause?

- A. Alcohol
- B. Aplastic anaemia
- C. Folate deficiency
- D. Myelodysplasia
- E. Reticulocytosis

Correct answer is C. A megaloblastic bone marrow occurs in Vitamin B12 or folate deficiency and with some cytotoxic drugs. The other causes of macrocytosis do not cause a megaloblastic bone marrow appearance.

20. An 82-year old man presents to his General Practitioner with a six month history of fatigue and increasing exertional dyspnea. Investigations showed:

Hemoglobin	7.5 g/dL
MCV	112 fL
White blood cells	$3.12 \times 10^9/L$
Neutrophils	34%
Blasts	1%
Platelets	$1.2 \times 10^9/L$

A bone marrow aspirate stained with Perl's stain showed ring sideroblasts.

What is the most likely diagnosis?

- A. Aplastic anaemia
- B. Chronic myeloid leukemia
- C. Metastatic bone marrow infiltration
- D. Myelodysplastic syndrome
- E. Myelofibrosis

Correct answer is D. The patient has a macrocytic anaemia, thrombocytopenia and neutropenia with a small number of circulating blasts. This suggests a diagnosis of myelodysplastic syndrome and is supported by the finding of ring sideroblasts in the marrow. Ring sideroblasts contain an abnormally high concentration of iron- usually stored in perinuclear mitochondria. Peri's stain (which stains for iron) shows this iron deposition as a dark ring around the margin of the nucleus.

21. A 45-year-old man is found incidentally to have a severely hypochromic and microcytic blood picture, with Hb 5.2g/dl. He is asymptomatic. Which of the following is the most discriminatory investigation?

A. Barium enema
B. Bone marrow biopsy
C. Gastroscopy
D. Hemoglobin electrophoresis
E. Ham test

Correct answer is D. Thalassemia trait is a common, usually asymptomatic abnormality. Red cells are hypochromic and microcytic, but iron and ferritin stores are normal. Hemoglobin electrophoresis shows raised HbA₂ (>3.5%) and raised HbF (normally consist predominantly of HbA with trace of HbF and HbA₂).

22. A 14-year-old boy presents with excessive bleeding from a tooth cavity following an extraction at the dentist. His investigations showed:

Hemoglobin	13.2 g/dL
Platelet count	$260 \times 10^9/L$
White cell count	$8 \times 10^9/L$
Prothrombin time	14 s
Activated partial thromboplastin time	45 s (30-40)
Factor VIII	45 U/dL (50-150)

Which of the following is the most likely diagnosis?

A. Disseminated intravascular coagulation
B. Hemophilia A
C. Hemophilia B
D. Idiopathic thrombocytopenic purpura
E. Von Willebrand's disease

Correct answer is E. This young boy with excessive bleeding has a slightly raised APTT and slightly reduced Factor VIII. Hemophilia is therefore unlikely and von Willebrand's is the most likely. DIC and ITP would typically be associated with thrombocytopenia.

23. A 56-year-old male was admitted for a total hip replacement due to osteoarthritis. There was no other medical history and physical examination was normal. A routine pre-operative FBC showed:

Hemoglobin	11 g/dL
Platelet count	$170 \times 10^9/L$
White cell count	$25 \times 10^9/L$
Neutrophil count	$5 \times 10^9/L$
Lymphocyte count	$19 \times 10^9/L$ (0.08×10^9)
Monocyte count	$0.9 \times 10^9/L$ (0.08×10^9)
Eosinophil count	$0.1 \times 10^9/L$ (0.04×10^9)
Basophil count	$0.08 \times 10^9/L$ (0.01×10^9)

His Blood film shows mature lymphocytes. What is the most appropriate initial management for this patient?

A. Cancel the patient's operation
B. Chlorambucil
C. Fludarabine
D. Observation
E. Prednisolone

Correct answer is D. The most significant abnormality on the full blood count is the lymphocytosis, with mature lymphocytes seen on film. In this age group the most likely diagnosis is a low grade lymphoproliferative disorder e.g. Chronic Lymphocytic Leukemia. This, as mentioned, is a low grade condition, and does not require immediate treatment; patients undergo a period of observation, often quite long, before any treatment is indicated. The indication for treatment would include:

1. Disabling B symptoms
2. Lymphocyte doubling time of < 6 months
3. Bone Marrow compromise
4. Autoimmune hemolysis or immune thrombocytopenia.

He is never going to be cured from this condition, and therefore it would not be necessary to delay/ cancel surgery. He may be slightly more at risk of infection, due to immune dysfunction that accompanies these conditions, and the surgeons should be aware of this.

Hematology (MCQs)

24. A 40-year-old man presents with bleeding gums and easy bruising. His only medication is Omeprazole for dyspepsia. Investigations showed:

Hemoglobin	12.5 g/dL
MCV	90 fL
Platelets	$20 \times 10^9/L$
Prothrombin time	13.5s (11.5-15.5)

Blood film: occasional giant platelets

What is the most likely diagnosis?

- A. A megakaryocytic thrombocytopenia
- B. Disseminated intravascular coagulation
- C. Drug-induced thrombocytopenia
- D. Immune thrombocytopenia
- E. Thrombotic thrombocytopenic purpura

Correct answer is D. Only abnormality is the very low platelet count. The Bone marrow is still working as there are giant platelets seen on film, which you see when there is peripheral consumption of the platelets (rules out Choice A). The large platelets are a sign that the bone marrow is churning them out prematurely to keep up with demands. With disseminated intravascular coagulation the prothrombin time would be prolonged. With thrombotic thrombocytopenic purpura the hemoglobin would be low as hemolysis is a feature. Drug induced thrombocytopenia in itself is an immune mechanism, and while Lansoprazole can cause a reduction in platelet count, it is not classically a drug you associate with drug induced thrombocytopenia. Immune thrombocytopenia, is very common, and would give this very low platelet count, and by choosing this answer it covers drug induced thrombocytopenia as well.

25. A 60-year-old lady with bruising is investigated and found to have the following Full Blood Count:

Hb	13g/dL
White cell count	$6.3 \times 10^9/L$
Platelet count	$15 \times 10^9/L$

She refuses to give consent to a bone marrow biopsy. What is the most appropriate management plan?

- A. Intravenous immunoglobulin
- B. No treatment
- C. Oral prednisolone
- D. Platelet transfusion
- E. Splenectomy

Correct answer is C. This lady most likely has Idiopathic Thrombocytopenic Purpura. The history should highlight any drug causes (not mentioned here) and a blood film would help exclude leukemia. A bone marrow examination is useful especially in the older person. Platelet transfusion would not be helpful without treating the underlying cause. No treatment is often an option but this lady is older and has bruising. Given the circumstances the best management plan is to treat with steroid.

Hematology (MCQs)

26. A 32-year-old man was prescribed an oral antibiotic for a urinary tract infection. Two days later he noticed that his urine was increasingly dark in colour. Investigations revealed:

Hemoglobin	8.5g/dL
Reticulocytes	$147 \times 10^9/L$ (25-85 $\times 10^9$)

Blood film: marked anisopoikilocytosis and bite cells

What is the most likely diagnosis?

- A. Acute Myeloid Leukemia
- B. Autoimmune hemolytic anaemia
- C. Hemoglobin H disease
- D. Hereditary spherocytosis
- E. Thalassemia Minor

Correct answer is B. If the diagnosis was hereditary spherocytosis, then the blood film would show spherocytes. In Hemoglobin H disease, the typical inclusions can be demonstrated in erythrocytes stained with brilliant cresyl blue, and a chronic microcytic, hypochromic anaemia would be present. Hemolytic anaemia may be precipitated by sulfonamides, and also by penicillins. This gentleman may have been treated with trimethoprim or penicillin, which then caused AIHA, with the typical blood film.

27. A 78-year-old female who is on warfarin for atrial fibrillation presents with melena. The blood pressure is 90/60 mmHg and the heart rate 100 bpm. Investigations showed:

Hemoglobin	9 g/dL
MCV	87 fL
INR	7.2

Which is the best option for correcting the coagulopathy?

- A. FFP
- B. IV Vitamin K
- C. Stop warfarin
- D. Stop warfarin and give IV Vitamin K
- E. Stop warfarin and give IV Vitamin K and Prothrombin complex concentrate

Correct answer is E. This patient is hypotensive and tachycardic with melena suggesting a major bleeding episode on warfarin. In these circumstances, current guidelines suggest stopping warfarin, giving IV vitamin K, and either FFP, or Prothrombin complex concentrate. FFP may not completely reverse the effects of warfarin, so it may now be preferable to consider Prothrombin complex concentrate (PCC) if available. The rate of fatal hemorrhage in patients receiving warfarin approaches 1%. It is therefore essential that knowledge regarding the reversal of warfarin coagulation is serviceable.

28. A 17-year-old male with glucose-6-phosphate dehydrogenase deficiency presents with tiredness and is noticed to be jaundiced. These features have developed since he developed a mild chest infection one week ago. Which one of the following is the most likely hematological finding?

- A. Hemoglobinuria
- B. low mean cell volume
- C. Positive direct antiglobulin test
- D. Reduced reticulocyte count
- E. Spherocytes present on blood film

Correct answer is A. G6PD deficiency is a red cell enzymopathy that can lead to acute intravascular hemolysis after exposure to certain drugs, infection etc. You would therefore get hemoglobinuria but would not get a positive direct antiglobulin test. The MCV and reticulocyte count would be high due to hemolysis. There is a form of G6PD deficiency where there is a chronic low level hemolysis, where there are spherocytes seen but the clinical information points to intravascular hemolysis after an infection.

29. A 71-year-old man presents with a tender left calf and has a background history of headaches, tiredness and dizziness. On examination he was plethoric, had a blood pressure of 185/105 mmHg and has a swollen, hot tender and erythematous left calf. Venous duplex confirmed DVT.

Hemoglobin	19 g/dL
Hematocrit	0.58 (0.40-0.52)
White cell count	11 $\times 10^9/L$
Platelet count	500 $\times 10^9/L$

Which of the following is the most appropriate investigation to establish the diagnosis?

- A. Abdominal ultrasound scan
- B. Arterial blood gases
- C. Bone marrow trephine
- D. Leucocyte alkaline phosphatase score
- E. Red blood cell mass

Correct answer is E. The most significant abnormality is the raised Hemoglobin and Hematocrit suggesting polycythemia which in the presence of all the other features suggest secondary polycythemia. Therefore, the most useful and appropriate investigation will be red cell mass study which would distinguish between true and relative polycythemia further investigations will then be dictated by the results of this initial test US, bone marrow etc and blood gases may be needed after the initial red cell mass studies. The leucocyte alkaline phosphatase score is rather outdated and seldom performed.

30. Whilst being investigated for infertility, a 30-year-old woman is noted to have some bruising on her limbs with a palpable spleen on abdominal examination. Investigations revealed:

Hemoglobin	10.0 g/dL
White cell count	110 $\times 10^9/L$
Neutrophils	60 $\times 10^9/L$ (1.5-7 $\times 10^9$)
Lymphocytes	2 $\times 10^9/L$ (1.5-4 $\times 10^9$)
Monocytes	0.8 $\times 10^9/L$ (0-0.8 $\times 10^9$)
Eosinophils	0.3 $\times 10^9/L$ (0.04-0.4 $\times 10^9$)
Basophils	0.7 $\times 10^9/L$ (0-0.1 $\times 10^9$)
Myelocyte	40 $\times 10^9/L$
Myeloblast	4 $\times 10^9/L$
Platelet count	900 $\times 10^9/L$

What is the most likely diagnosis?

- A. Acute myeloid leukemia
- B. Acute promyelocytic leukemia
- C. Chronic myeloid leukemia
- D. Essential thrombocythemia
- E. Myelofibrosis

Correct answer is C. The features of this blood film are anaemia, thrombocytosis, neutrophilia with roughly 55% neutrophils, 40% myelocyte with less than 5% blast cells. This is typical of Chronic Myeloid Leukemia which usually has associated tender splenomegaly. Usually the Philadelphia chromosome is present in 95% of cases. Acute leukemia is defined as blast cells constituting over 30% of cell type present. Chronic myeloid leukemia often ends in acute blastic transformation after a mean duration of approx 4 years.

31. A 50-year-old man complains of gingival bleeding, epistaxis, and fever for 2 days. He appears acutely ill. Blood tests showed 16,000 leukocytes/mm³ with numerous myeloid blasts. Platelet count is 15,000/mm³. A bone marrow biopsy demonstrates hypercellular marrow, with 35% blasts. Which of the following is the most likely diagnosis?

- A. Acute lymphocytic leukemia (ALL).
- B. Acute myelogenous leukemia (AML).
- C. Chronic myelogenous leukemia (CML).
- D. Leukemoid reaction.
- E. Myelodysplastic.

The correct answer is B. The clinical manifestations are consistent with acute myelogenous leukemia (AML). This disease of middle-aged people (median age at presentation is 50 years) is due to neoplastic transformation of a bone marrow stem cell that is incapable of differentiating into mature leukocytes. A large number of blasts invade the bone marrow and the peripheral blood.

Extended Matching Questions (EMQs)

Hematology (EMQs)

1. Causes of Anaemia

- | | |
|---------------------------------|--------------------------|
| A. Aplastic anaemia | G. Pyruvate kinase |
| B. Autoimmune hemolytic anaemia | H. Sickle-cell anaemia |
| C. Folate deficiency | I. Sideroblastic anaemia |
| D. Glucose-6-phosphate | J. Spherocytosis |
| E. Iron deficiency anaemia | K. Thalassemia |
| F. Pernicious anaemia | L. Thalassemia minor |

For each clinical scenario below, give the most likely cause for the clinical findings. Each option may be used only once.

1. A 23-year-old man presents with recurrent nose-bleeds and infection after a course of chemotherapy.
2. A 24-year-old man presents with a worsening anaemia and jaundice. A blood film taken several weeks after the incident shows the presence of Heinz bodies.
3. A 50-year-old man presents with tiredness, dyspnea and Paraesthesia. On examination he showed extensor plantars, brisk knee jerks and absent ankle jerks. His blood film shows macrocytic anaemia.
4. A 23-year-old woman on trimethoprim for recurrent urinary tract infections (UTIs) presents with a macrocytic anaemia.
5. A 25-year-old woman with systemic lupus erythematosus (SLE) presents with an acute anaemia. She was successfully treated with steroids. Direct Coombs' test was strongly positive; direct antiglobulin test was positive with IgG alone.

Hematology (EMQs)

Answers: A D F C B

1- A 23-year-old man presents with recurrent nose-bleeds and infection after a course of chemotherapy.

Answer is A: Aplastic anaemia is a presentation of pancytopenia with hypoplastic marrow. Aplastic anaemia can be either primary or secondary. The most common cause of primary aplastic anaemia is idiopathic acquired aplastic anaemia. Congenital causes of primary aplastic anaemia are very rare, e.g. Fanconi's anaemia. Secondary causes of aplastic anaemia include infection (especially viral, e.g. hepatitis, measles, parvovirus B19) and drugs. Cytotoxic drugs such as busulphan and doxorubicin are well-recognized causes of secondary aplastic anaemia via a type A (dose-related) response. Non-cytotoxic drugs such as chloramphenicol and gold have also been reported to cause aplasia via a type B (not dose-related) response. Rarely, pregnancy is associated with a secondary aplastic anaemia.

2- A 24-year-old man presents with a worsening anaemia and jaundice. A blood film taken several weeks after the incident shows the presence of Heinz bodies.

Answer is D: Glucose-6-phosphate dehydrogenase (G6PDH) deficiency is the most common red blood cell enzyme defect and is more common in patients of Mediterranean origin. Individuals with this condition are susceptible to oxidative crises precipitated by Fava beans and drugs such as ciprofloxacin and sulphonamides. G6PDH plays an important role in the hexose monophosphate shunt which provides NADPH (reduced nicotinamide adenine dinucleotide phosphate – the reducing agent). NADPH is used to regenerate glutathione. In the absence of glutathione, red blood cells are exposed to oxidative stress. Heinz bodies represent oxidized hemoglobin.

3- A 50-year-old man presents with tiredness, dyspnea and Paraesthesia. On examination he showed extensor plantars, brisk knee jerks and absent ankle jerks. His blood film shows macrocytic anaemia.

Answer is F: Pernicious anaemia is the most common cause of vitamin B12 deficiency. This is an autoimmune condition characterized by atrophy of the gastric mucosa with subsequent failure of intrinsic factor production. Intrinsic factor is required for vitamin B12 absorption. Other causes of vitamin B12 deficiency are terminal ileum disease, gastrectomy and low dietary intake (e.g. vegans). It is important to establish the cause of the vitamin B12 deficiency because this affects management. Dietary deficiency can be treated with oral vitamin B12 whereas parenteral vitamin B12 (e.g. intramuscular hydroxocobalamin) is required for pernicious anaemia.

4- A 23-year-old woman on trimethoprim for recurrent urinary tract infections (UTIs) presents with a macrocytic anaemia.

Answer is C: Causes of macrocytosis include vitamin B12 / folate deficiency, alcohol, liver disease, hypothyroidism and myelodysplasia. Trimethoprim is a bacterial dihydrofolate reductase inhibitor, but with prolonged therapy it may act as a human dihydrofolate reductase inhibitor. It is avoided in pregnancy because the interference with folate metabolism could prove teratogenic. Bone marrow biopsy is indicated if the cause of the macrocytosis is not established with blood tests.

5- A 25-year-old woman with SLE presents with an acute anaemia. She was successfully treated with steroids. A direct Coombs' test was strongly positive; direct antiglobulin test was positive with IgG alone.

Answer is B: There are many causes of anaemia in a patient with SLE, including iron deficiency anaemia secondary to non-steroidal anti-inflammatory drugs (NSAID) use and bone marrow suppression secondary to immunosuppressive drugs, e.g. cyclophosphamide/azathioprine. Autoimmune hemolytic anaemia (AHA) is the cause of anaemia in this patient. A direct Coombs' test demonstrates and confirms the presence of antibody binding to red blood cells. Other causes of secondary AHA include lymphoma, infections (e.g. Epstein-Barr virus [EBV], Mycoplasma spp.), carcinoma and other autoimmune conditions. Some drugs may also cause an immune hemolysis, e.g. methylodopa treatment can induce the formation of red cell autoantibodies.

2. Anaemia

- A. Anaemia of chronic disease
- B. Aplastic anaemia
- C. Autoimmune hemolytic
- D. Hemophilia A
- E. Hereditary spherocytosis
- F. Iron deficiency anaemia

- G. Pyruvate kinase deficiency
- H. Sickle-cell disease
- I. Sideroblastic anaemia
- J. Thalassemia major
- K. Thalassemia minor anaemia
- L. Vitamin B₁₂ deficiency anaemia

For each clinical scenario below, give the most likely cause for the clinical findings. Each option may be used only once.

1. A 70-year-old woman with rheumatoid arthritis presents with a normocytic normochromic anaemia: Hb 10.1 g/dl. Hematinics normal, direct Coombs' test negative.
2. A 24-year-old woman with anaemia and splenomegaly is referred to the hematologist. Her direct Coombs' test is negative. Her blood film shows the presence of reticulocytes and spherocytes.
3. A 17-year-old boy presents with pain in his abdomen and hands. He is pyrexial and anaemic.
4. Full blood count of a 65-year-old woman taking ibuprofen for her osteoarthritic knee pain for a number of years shows a microcytic anaemia.
5. Full blood count of a 45-year-old man treated for gastric carcinoma with total gastrectomy reveals a macrocytic anaemia.

Answers: A E H F L

- 1- A 70-year-old woman with rheumatoid arthritis presents with a normocytic normochromic anaemia: Hb 10.1 g/dl. Hematinics normal, direct Coombs' test negative.

Answer is A: Anaemia of chronic disease is associated with many chronic inflammatory diseases and malignancy. This anaemia is mild and normocytic, so it is incorrect to attribute anaemia with Hb 8 g/dl to chronic disease. All other causes for the anaemia must be ruled out before making the diagnosis of anaemia of chronic disease.

- 2- A 24-year-old woman with anaemia and splenomegaly is referred to the hematologist. Her direct Coombs' test is negative. Her blood film shows the presence of reticulocytes and spherocytes.

Answer is E: Hereditary spherocytosis is a genetic defect in the red cell membrane structure. Most cases are inherited in an autosomal dominant fashion but the patient can also present without family history as a result of spontaneous mutation. Patients may present with jaundice at birth but can also remain asymptomatic for many years. The direct Coombs' test is negative in hereditary spherocytosis. This is an important test because spherocytes are also commonly found in autoimmune hemolytic anaemia. Treatment of choice is splenectomy because the spleen is the site of spherocyte removal.

- 3- A 17-year-old tourist from the West Indies presents with pain in his abdomen and hands. He is pyrexial and anaemic.

Answer is H: Sickle-cell anaemia results from an amino acid substitution in the gene coding for the chain of Hb, giving rise to altered Hb known as HbS. HbS polymerizes when deoxygenated, producing characteristically sickle-shaped cells. This results in both a hemolytic anaemia and occlusion of small blood vessels. Several sickle-cell crises are recognized:

- Infarction crises give rise to the painful hand and foot syndrome, avascular necrosis of the femoral head, splenic infarction and priapism. A patient with hepatosplenomegaly may be suffering from a sequestration crisis where sickle cells have been trapped in the liver and spleen.
- Hemolytic crisis resulting in jaundice may be precipitated by an infection, drug, etc.
- Aplastic crises may occur secondary to infection (usually by parvovirus).

- 4- Full blood count of a 65-year-old woman taking ibuprofen for her osteoarthritic knee pain for a number of years shows a microcytic anaemia.

Answer is F: Iron deficiency anaemia classically causes a microcytosis. The most likely cause in this case is loss from the gastrointestinal tract as a result of chronic NSAID use.

- 5- Full blood count of a 45-year-old man treated for gastric carcinoma with total gastrectomy reveals a macrocytic anaemia.

Answer is L: Intrinsic factor secreted by the stomach is required for vitamin B₁₂ absorption. The Schilling test can be used to determine whether low serum vitamin B is the result of malabsorption from the terminal ileum or lack of intrinsic factor secreted by the stomach.

3. Anaemia

- A. Anaemia of chronic disease
- B. Aplastic anaemia
- C. Autoimmune hemolytic anaemia
- D. Folate deficiency anaemia
- E. G6PD deficiency
- F. Iron deficiency anaemia

- G. Pernicious anaemia
- H. Sickle cell anaemia
- I. Sideroblastic anaemia
- J. Spherocytosis
- K. Thalassemia major

For each clinical scenario below, give the most likely cause for the clinical findings. Each option may be used only once.

1. A 49- year- old radiographer presents with pallor, recurrent infections and epistaxis. ☐
2. A 46- year- old epileptic on Phenytoin presents with marked pallor. ☐
3. A 14- year- old girl presents with fatigue. Her father was diagnosed in his youth as having recurrent anaemia. On examination she is pale with a tinge of jaundice. The tip of her spleen is palpable. ☐
4. A 78- year- old man presents with night fever, night sweats, easy fatiguability and pallor. On examination he has generalized lymphadenopathy and a large spleen. ☐
5. A 12- year- old boy with dysmorphic features was treated for 8 weeks with oral iron for anaemia without response. His blood film was dimorphic. ☐

Answers: B D J C K

1. A 49- year- old radiographer presents with pallor, recurrent infections and epistaxis.
Answer is B: Exposure to radiation is a risk factor for aplastic anaemia.

2. A 46- year- old epileptic on Phenytoin presents with marked pallor.
Answer is D: Phenytoin causes a reduction in folic acid levels. Folic acid is presented in foods as polyglutamate, which is then converted into mono glutamates by intestinal conjugase. Phenytoin acts by inhibiting this enzyme, thereby causing folate deficiency.

3. A 14- year- old girl presents with fatigue. Her father was diagnosed in his youth as having recurrent anaemia. On examination she is pale with a tinge of jaundice. The tip of her spleen is palpable.

Answer is J: Spherocytosis is an auto- hemolytic anaemia, characterized by the production of erythrocytes that are sphere shaped. Spherocytes are found in hereditary spherocytosis and autoimmune hemolytic anaemia. The misshapen but otherwise healthy erythrocytes are mistaken by the spleen for old or damaged erythrocytes and it thus constantly breaks them down, causing auto- hemolysis.

4. A 78- year- old man presents with night fever, night sweats, easy fatiguability and pallor. On examination he has generalized lymphadenopathy and a large spleen.

Answer is C: Types of AIHA include warm autoimmune hemolytic anaemia, cold agglutinin disease and paroxysmal cold hemoglobinuria. AIHA can be induced by several drugs, e.g. methyl dopa, and also by some disease conditions, including Mycoplasma pneumoniae and infectious mononucleosis.

5. A 12- year- old boy with dysmorphic features was treated for 8 weeks with oral iron for anaemia without response. His blood film was dimorphic.

Answer is K: Thalassemia is an inherited autosomal recessive disease. The genetic defect, which could be either mutation or deletion, results in reduced rate of synthesis or no synthesis of one of the globin chains that make up hemoglobin. This can cause the formation of abnormal hemoglobin molecules, thus causing anaemia.

4. Hematological Diseases

- A. Amyloidosis
- B. Antiphospholipid syndrome
- C. Burkitt's lymphoma
- D. Chronic lymphocytic leukemia
- E. Chronic myeloid leukemia
- F. Essential thrombocythemia

- G. Hodgkin's lymphoma
- H. Myeloma
- I. Paroxysmal nocturnal hemoglobinuria
- J. Polycythemia rubra vera
- K. Waldenström's macroglobulinemia

For each clinical scenario below, give the most likely cause for the clinical findings. Each option may be used only once.

1. A 25-year-old man presents with enlarged painless lymph nodes in the neck. His peripheral blood film shows Reed–Sternberg cells. ☐
2. A 45-year-old man presents with fever, weight loss, tiredness and gout. On examination there is splenomegaly. White blood cell count is $112 \times 10^9/l$. The Philadelphia chromosome is detected. ☐
3. A 70-year-old woman complains of weight loss, headache, blurred vision, lethargy and hematuria. Positive findings on examination include cervical lymphadenopathy, splenomegaly and numerous retinal hemorrhages. Bone marrow biopsy shows lymph plasmacytoid cell infiltrate. ☐
4. A 27-year-old man presents with hemolytic anaemia after surgery. He reports a history of recurrent abdominal pains. The Ham's test is positive. ☐
5. A 60-year-old man presents with headaches, blurred vision and itching over the whole body (the last after a hot bath). Positive findings on examination include plethoric facies and moderate splenomegaly. Hematocrit: 65 per cent. ☐

Answers: G E K I J

- 1- A 25-year-old man presents with enlarged painless lymph nodes in the neck. His peripheral blood film shows Reed–Sternberg cells

Answer is G: Reed–Sternberg cells are classically binucleate and pathognomonic of Hodgkin's lymphoma. The two large nuclei can give rise to an owl's eye appearance.

- 2- A 45-year-old man presents with fever, weight loss, tiredness and gout. On examination there is splenomegaly. White blood cell count is $112 \times 10^9/l$. The Philadelphia chromosome is detected.

Answer is E: Chronic myeloid leukemia (CML) is a myeloproliferative disorder characterized by uncontrolled proliferation of myeloid cells where the white cell count is often $100 \times 10^9/l$. The highest incidence of CML is in middle age. Myeloproliferative and lymphoproliferative disorders can be associated with hyperuricemia and thus gout caused by increased turnover of purines. The Philadelphia chromosome, a translocation between the long arm of chromosome 22 to chromosome 9, is seen in around 95 per cent patients. Treatment options include the use of interferon, hydroxyurea and allogeneic transplantation from a suitable donor.

- 3- A 70-year-old woman complains of weight loss, headache, blurred vision, lethargy and hematuria. Positive findings on examination include cervical lymphadenopathy, splenomegaly and numerous retinal hemorrhages. Bone marrow biopsy shows lymph plasmacytoid cell infiltrate.

Answer is K: Waldenström's macroglobulinemia (WM) is a lymph plasmacytoid lymphoma that usually affects older men. The clinical manifestations of the disease, e.g. hyperviscosity, result from the production of IgM paraprotein. Myeloma can also give signs of hyperviscosity, but splenomegaly and lymphadenopathy make WM more likely. Bone marrow biopsy shows the presence of lymph plasmacytoid cells. There are usually very few plasma cells unlike myeloma, which shows a characteristic infiltrate of plasma cells.

- 4- A 27-year-old man presents with hemolytic anaemia after surgery. He reports a history of recurrent abdominal pains. The Ham's test is positive.

Answer is I: Paroxysmal nocturnal hemoglobinuria (PNH) is an acquired defect where red cells are unusually sensitive to destruction by activated complement. Patients may present non-specifically with recurrent abdominal pains or with hemolytic anaemia. Venous thrombotic episodes are very common in patients with PNH. The condition acquired its name from the characteristic finding of dark-colored urine when voiding at night or early in the morning. In Ham's test, the cells from a PNH patient will lyse more readily in acidified serum than normal red blood cells. Serum heated to around 56°C will inactivate complement and thus hemolysis will not occur. As a result of the high risk of venous thrombosis, long-term coagulation may be necessary. Deficient hematopoiesis may also occur and PNH may progress to aplastic anaemia in around 10–20 per cent individuals.

- 5- A 60-year-old man presents with headaches, blurred vision and itching over the whole body (the last after a hot bath). Positive findings on examination include plethoric facies and moderate splenomegaly. Hematocrit: 65 per cent.

Answer is J: Polycythemia rubra Vera (PRV) is a primary polycythemia where there is excessive proliferation of red blood cells caused by a clonal disorder of pluripotent stem cells. The condition usually presents in late middle age – elderly patients with signs of hyperviscosity, e.g. blurred vision (retinal hemorrhages), headaches, bleeding, etc. Severe pruritus after a hot bath is a commonly reported finding. The patient typically has plethoric facies and may be cyanotic as a result of stagnation and deoxygenation of the blood in peripheral vessels. Splenomegaly is very common in PRV, unlike secondary polycythemia. Blood tests show an elevated packed cell volume. The white cell count is usually raised. A raised red cell mass can be shown with ^{51}Cr studies. The aim of treatment is to normalize the full blood count and prevent the complications of thrombosis and hemorrhage. Venesection is the treatment of choice. Hydroxyurea chemotherapy can also be used to control thrombocytosis.

Short Heading Questions (SHQ)

1- All of the following are seen in intravascular hemolysis **EXCEPT**:

- A. High urinary urobilinogen
- B. Reticulocytosis
- C. High plasma stercobilinogen
- D. High urinary hemosiderin
- E. LDH

2- Commonest cause of jaundice in thalassemia is:

- A. Viral hepatitis C
- B. Iron deposition in liver
- C. Viral hepatitis B
- D. Hemolysis
- E. Gall stones

3- Which of the following anemias is associated with splenomegaly?

- A. Chronic renal failure
- B. Aplastic anaemia
- C. Hereditary spherocytosis
- D. Sickle-cell anaemia
- E. Sideroblastic anaemia

4- All of the following may cause abdominal pain in thalassemia major **EXCEPT**:

- A. Vasculitis
- B. Splenic infarction
- C. Dragging pain due to huge splenomegaly
- D. Pigment stone-induced biliary colic
- E. Hemolytic crisis

5- Which of the following does not have target cells in peripheral blood?

- A. Lymphoma
- B. Cholestatic jaundice
- C. Thalassemia
- D. Iron deficiency anaemia
- E. Hypsplenism

6- Virchow's node receives lymphatics from all **EXCEPT**:

- A. Testes
- B. Stomach
- C. Prostate
- D. Breast
- E. Kidney

7- All of the following produce microcytic anaemia **EXCEPT**:

- A. Sideroblastic anaemia
- B. Thalassemia
- C. Pernicious anaemia
- D. Lead poisoning
- E. Iron deficiency anaemia

8- All of the following may produce agranulocytosis **EXCEPT**:

- A. Methyldopa
- B. Interferon
- C. Gold salts
- D. Chloramphenicol
- E. Carbimazole

9- Basophilic stippling is classically seen in:

- A. Chronic myeloid leukemia
- B. Myelosclerosis
- C. Chronic lead poisoning
- D. Iron deficiency anaemia
- E. Basophilic leukemia

10- Which of the following is not a myeloproliferative disorder:

- A. Chronic myeloid leukemia
- B. Polycythemia vera
- C. Essential thrombocytopenia
- D. Myeloid metaplasia
- E. Myelofibrosis

11- Gum bleeding is characteristic of all **EXCEPT**:

- A. Chronic Phenytoin therapy
- B. Aplastic anaemia
- C. Scurvy
- D. Hemophilia
- E. Monocytic leukemia

12- Which is not associated with hypersplenism:

- A. Splenomegaly
- B. Hypocellular bone marrow
- C. Pancytopenia
- D. Reversibility by splenectomy
- E. Short RBCs survival

13- Splenectomy is virtually curative in:

- A. G6PD deficiency
- B. Iron deficiency
- C. Thalassemia
- D. Hereditary spherocytosis
- E. Sickle cell anaemia

14- Red cell osmotic fragility is increased in:

- A. Thalassemia major
- B. Hereditary spherocytosis
- C. Hb C disease
- D. Iron deficiency anaemia
- E. Paroxysmal nocturnal hemoglobinuria

15- Plummer-Vinson syndrome is not associated with:

- A. Angular stomatitis
- B. Splenomegaly
- C. Clubbing
- D. Post-ericoid web
- E. Pica

16- The outstanding feature of idiopathic thrombocytopenic purpura (ITP) is:

- A. Fever
- B. Gum bleeding
- C. Moderate splenomegaly
- D. Presence of sternal tenderness
- E. Fatigue.

17- Plasmapheresis may be done in all EXCEPT:

- A. Cryoglobulinemia
- B. Goodpasture's disease
- C. Hypoplastic anaemia
- D. Myasthenia gravis
- E. Guillain-Barre syndrome

18- Circulating anticoagulants are found in:

- A. Hairy cell leukemia
- B. SLE
- C. Multiple myeloma
- D. Dermatomyositis
- E. HELLP syndrome

19- Which of the following is false in hemophilia:

- A. Normal prothrombin time
- B. von Willebrand antigens level is grossly diminished
- C. Increased partial thromboplastin time
- D. Absent factor VIII coagulant activity
- E. Prolonged bleeding time

20- Incorrect statement in pernicious anaemia is:

- A. Hyperchlorhydria
- B. Premature graying of hair
- C. Anti-intrinsic factor antibody in 60% patients
- D. Gastric polyp may develop
- E. Macrocytosis

21- Which is not true in polycythemia vera:

- A. Increased RBC mass
- B. Markedly hypercellular marrow
- C. Thrombocytopenia
- D. Basophilia
- E. Hyperuricemia

22- Disseminated intravascular coagulation (DIC) may be seen in all EXCEPT:

- A. Amniotic fluid embolism
- B. Rocky Mountain spotted fever
- C. Giant hemangioma
- D. Diabetes mellitus
- E. Hemorrhagic pancreatitis

23- Thalassemia major may be associated with all EXCEPT:

- A. Cardiac arrhythmia
- B. Cardiac tamponade
- C. Congestive cardiac failure
- D. Cardiomegaly
- E. Hypersplenism

24- Hess' capillary fragility test is positive in:

- A. Cushing's syndrome
- B. Idiopathic thrombocytopenic purpura
- C. Paraproteinemias
- D. Vasculitis
- E. Scurvy

25- Hepatosplenomegaly with lymphadenopathy is found in all **EXCEPT**:

- A. Acute lymphatic leukemia
- B. Lymphoma
- C. Chronic myeloid leukemia
- D. Disseminated tuberculosis
- E. Infectious mononucleosis

26- Iron transport protein is:

- A. Transcobalamin II
- B. Ferritin
- C. Haptoglobin
- D. Transferrin
- E. Ferroprotein

27- Most effective treatment of polycythemia vera is:

- A. Fresh frozen plasma
- B. Splenectomy
- C. Phlebotomy
- D. Exchange transfusion
- E. Cyclophosphamide

28- Which is not a vitamin K-dependent factor:

- A. Factor VIII
- B. Factor VII
- C. Factor X
- D. Factor II
- E. Factor IX

29- Eosinophilia is a feature of:

- A. Non-Hodgkin's lymphoma
- B. Sickle-cell anaemia
- C. Hodgkin's disease
- D. Hemophilia
- E. Cushing's syndrome

30- p iron and p iron-binding capacity are seen in:

- A. Recurrent GI tract hemorrhage
- B. Intestinal resection
- C. Chronic infections
- D. Menorrhagia
- E. Iron deficiency anaemia

31- Carcino-embryonic antigen is the tumour marker of:

- A. Medullary carcinoma of thyroid
- B. Hepatocellular carcinoma
- C. Bronchogenic carcinoma
- D. Colorectal carcinoma
- E. Thymoma

32- Which is not true in relation to multiple myeloma:

- A. Hyperviscosity syndrome
- B. Renal failure
- C. Moderate splenomegaly
- D. Response to melphalan
- E. Hypocalcaemia

33- Autoimmune hemolytic anaemia is associated with:

- A. ALL
- B. CLL
- C. AML
- D. CML
- E. PNH

34- Multiple myeloma does not feature:

- A. Normal Calcium
- B. Normal Uric acid
- C. Hyperglobulinemia
- D. Normal Phosphate
- E. Anaemia

35- Half-life of platelet is:

- A. 1-2 days
- B. 3-4 days
- C. 5-6 days
- D. 7-8 days
- E. 10 days

36- Pancytopenia may develop from all **EXCEPT**

- A. Haemosiderosis
- B. Paroxysmal nocturnal hemoglobinuria (PNH)
- C. Acute myeloid leukemia (AMI)
- D. Chloramphenicol.
- E. Hypersplenism

37- Peripheral blood picture is the most useful diagnostic aid in:

- A. A Non-Hodgkin's lymphoma
- B. Multiple myeloma
- C. Myelodysplastic syndrome
- D. Chronic myeloid leukemia
- E. Iron deficiency anaemia

38- Which is false in polycythemia vera

- A. High erythropoietin level
- B. Massive splenomegaly
- C. Hyperviscosity
- D. Normal arterial saturation
- E. Low ESR

39- Splenectomy is contraindicated in:

- A. Pyruvate kinase deficiency
- B. Immune thrombocytopenic purpura
- C. Marrow failure
- D. Spherocytosis
- E. Thalassemia

Answer key:

- 1- C
- 2- D
- 3- C
- 4- A
- 5- A
- 6- C
- 7- C
- 8- A
- 9- C
- 10- C
- 11- A
- 12- B
- 13- D
- 14- B
- 15- C
- 16- B
- 17- C
- 18- B
- 19- B
- 20- A
- 21- C
- 22- D
- 23- B
- 24- B
- 25- C
- 26- D
- 27- C
- 28- A
- 29- C
- 30- C
- 31- D
- 32- C
- 33- B
- 34- D
- 35- B
- 36- A
- 37- D
- 38- A
- 39- C

RHEUMATOLOGY

Multiple Choice Questions (MCQs)

1. A 40-year-old man presents with the acute onset of severe pain in his left great toe for the past 24 hours. He denies trauma, fever, chills, or changes in appetite. He is a chronic smoker but does not abuse alcohol. He is currently on day 4 of a course of erythromycin for bronchitis. Examination shows his blood pressure is 120/80 mm Hg, pulse is 80/min, and respirations are 18/min. The left great toe is red, swollen, and tender to touch, with no fluctuation. Laboratory evaluation shows the following: Sodium 139 mEq/L, Potassium 4.5 mEq/L, Hemoglobin 13.5 gm/dL, Leukocytes 9000/mm³, Platelets 350,000/mm³ and Uric acid 14 mg/dL. Which of the following is the most appropriate initial step in management?

- A. Allopurinol
- B. Colchicine
- C. Indomethacin
- D. Intra-articular corticosteroids
- E. Probenecid

The correct answer is C. The classic presentation, along with the hyperuricemia, makes gouty arthritis the most likely diagnosis. Nonsteroidal anti-inflammatory drugs (NSAIDs) are the treatment of choice of acute gouty arthritis. They are somewhat less specific than colchicine for gout but are better tolerated and work quickly.

Allopurinol (choice A) is used in the intercritical period between attacks, not in acute attacks. Colchicine (choice B) is effective for acute gouty arthritis but is poorly tolerated at the high, frequent doses required for an acute attack; Steroids (choice D) can be used in an acute episode, but not before a trial with NSAIDs and/or colchicine is attempted.

Probenecid (choice E) is a uricosuric agent used in the intercritical period, not during acute attacks, in patients who are under excretor of uric acid

2. A 28-year-old man presents with sores on his penis and scrotum. He also has lesions in his oral cavity which began a few days before the sores on his genitalia. He has had several similar episodes in the past, but they resolved before he consulted a physician. During these periods, his eyes often hurt when he goes into bright light. He has also had recent intermittent pain in his knees. Physical examination demonstrates oral lesions resembling aphthous ulcers, as well as small ulcers on the genitalia. Blood studies demonstrate an elevated erythrocyte sedimentation rate (ESR), elevated alpha-2 and gamma globulins, and mild leukocytosis. Which of the following is the most likely diagnosis?

- A. Behcet syndrome
- B. Herpes simplex infection
- C. Neisseria gonorrhoeae infection
- D. Psoriasis
- E. Treponema Pallidum infection

The correct answer is A. This is Behcet syndrome. The laboratory findings are usually nonspecific indications of an inflammatory process (such as those illustrated in the question stem), so the diagnosis is usually established by the history (and may take months to years since not all features are typically present from the beginning. Characteristic features include painful oral ulcers, painful genital ulcers (in men, in women they may be painless), ocular disease (most often a relapsing iridocyclitis that causes pain and photophobia), skin lesions (papules, pustules, vesicles, or folliculitis), and mild arthritis of large joints. Other features that may be seen include CNS involvement and migratory thrombophlebitis.

3. A 45-year-old woman presents with recent onset of low back pain for the past 3 days. She has not sustained any significant trauma. She has a history of systemic lupus erythematosus and has been receiving chronic corticosteroid treatment. She is currently afebrile. Examination reveals tenderness on palpation of the lumbar spine. The pain does not radiate down the leg. Which of the following is the most likely diagnosis?

- A. Ankylosing spondylitis
- B. Cauda equina syndrome
- C. Compression fracture
- D. Herniated intervertebral disk
- E. Infection

The correct answer is C. From a primary care perspective, the great majority of cases of low back pain are due to degenerative joint disease. However, the primary care physician should be alert to "red flags" that may signal the presence of more serious pathology. A history of corticosteroid treatment may be associated with osteoporosis of the vertebral column, which predisposes patients to compression fractures of the vertebral bodies. This type of fracture may present with back pain without any apparent history of preceding trauma

4. A 36-year-old woman presents with a 16-year-history of severe rheumatoid arthritis. She has had progressive difficulty walking for the past 3 months and is now virtually bedridden. Involved joints include proximal small joints of the hands, wrists, shoulders, knees, and ankles, with erosions and moderate deformities. Current medications include naproxen, methotrexate, and prednisone. Clinical examination shows mildly swollen and tender joints in the noted areas. Neurologic examination is notable for increased tone in both lower limbs, bilateral pathologically brisk reflexes in the upper and lower limbs, ankle clonus, positive Babinski sign, and minimal patchy sensory loss in the hands and feet. Which of the following is the most likely diagnosis?

- A. Atlantoaxial dislocation
- B. Cervical spondylotic myelopathy
- C. Osteoporotic spinal fractures and cord compression
- D. Peripheral neuropathy
- E. Spinal epidural lipomatosis

The correct answer is A. There is clear clinical evidence of corticospinal tract disease. Inflammation and destruction of the atlantoaxial joints is a crucial clinical diagnosis to make in the management of patients with severe rheumatoid arthritis. Local pain may be minimal, and the progression may be so slow that dysfunction and

disability are attributed to peripheral arthritis. Episodes of deficit progression may occur and may be precipitated by unusual neck movements. Any kind of manipulation is absolutely contraindicated. Management requires urgent neuro-radiologic (MRI) and neurosurgical evaluations.

5. A 50-year-old woman presents with progressive muscle pain and weakness for 3 weeks. The symptoms are localized mainly to the proximal muscle groups, affecting the deltoid and the pelvic muscles. On physical examination, there is tenderness on palpation of affected muscles and objective loss of strength. Laboratory investigations reveal a serum creatine kinase level of 2000 U/L. Electromyography demonstrates myopathic changes. A biopsy of the deltoid muscle reveals atrophy and necrosis of scattered myofibers with endomysial inflammatory infiltration mostly composed of lymphocytes. **Which of the following is the most likely diagnosis?**

- A. Denervation atrophy
- B. Dermatomyositis
- C. Inclusion body myositis
- D. Polymyositis
- E. Systemic lupus erythematosus

The correct answer is D. Polymyositis presents with the described clinical picture, i.e., proximal muscle weakness and pain. Because of ongoing destruction of myofibers, the levels of creatine kinase are often strikingly elevated.

6. A 22-year-old woman presents with an 8-month history of bilateral and symmetric polyarthritis affecting the proximal small joints of the hands, wrists, elbows, knees, hips, and ankles. Morning stiffness is prominent. Marginal bony erosions are noted on radiologic examination. The erythrocyte sedimentation rate (ESR) is 66 mm/hr, and rheumatoid factor is positive. She has been treated with paracetamol and ibuprofen (600 mg, 2-3 times a day) with minimal relief. Clinical examination confirms the presence of fluid and swelling of the joints. **Which of the following is the most appropriate management strategy?**

- A. Anti-inflammatory doses of NSAIDs
- B. Increase dose of Paracetamol
- C. NSAIDs and a DMARD
- D. NSAIDs and low-dose prednisone
- E. NSAIDs with low-dose narcotic analgesics

The correct answer is C. This patient seems to have aggressive erosive disease and requires a disease-modifying (slow-acting antirheumatic) drug (DMARD). There are numerous choices, including methotrexate, cyclosporine, minocycline, and anti cytokine (tumor necrosis factor) therapies. Anti-inflammatory doses of NSAIDs are also generally required. Short-term use of prednisone may be of use to control inflammation rapidly, but only in conjunction with disease-modifying therapy. Longer-term, low-dose (less than 10 mg) use is common in as many as one fourth of patients seen in hospital-based clinics because of inadequately controlled inflammation. Anti-inflammatory therapy alone can allow progression of erosive joint disease.

NSAIDs alone (**choice A**) are inappropriate in this case because of the reasons noted

above. Pain relief should occur through control of inflammation, rather than the use of narcotics (**choice E**). The efficacy of narcotics alone in inflammatory arthritic pain is limited. NSAIDs with prednisone (**choice D**) may be very effective for controlling overt symptoms but not for preventing disease progression.

7. A 45-year-old woman with systemic lupus erythematosus (SLE) currently is not taking any medication. Blood urea nitrogen (BUN) 23 mg/dL, a creatinine of 1.6 mg/dL and a mild normocytic anemia. ESR is 18 mm/min. Urinalysis shows microhematuria and mild proteinuria. **Which of the following is the most appropriate next step in management?**

- A. Renal biopsy
- B. Repeat urine analysis at next routine examination
- C. Sequential serum complement and ANA studies
- D. Treatment with corticosteroids
- E. Treatment with cyclophosphamide

The correct answer is A. Renal involvement is one of the most common manifestations of systemic lupus erythematosus (SLE) and a major cause of morbidity and mortality. When renal abnormalities are detected in patients with SLE, a renal biopsy must be performed. SLE may, in fact, lead to various types of morphologic changes, which can be evaluated only by biopsy examination and have fundamental implications for choosing the most appropriate therapy.

Treatment with corticosteroids (**choice D**) represents the mainstay of therapy for SLE patients with proliferative glomerular lesions (types I and IV). If these patients do not respond to corticosteroids, cyclophosphamide is used

8. A 48-year-old man presents with a 2-day history of severe low back pain. He states that he has had periodic low back pain for years, but this is more severe than usual and radiates to the buttock and down the right leg. His temperature is 36.8°C. Examination shows some rigidity of the lumbar spine. The pain is exacerbated by applying pressure on the paravertebral region in the lower lumbar spine and by passively raising the leg at 45 degrees while the patient lies supine. A reduced Achilles tendon reflex is noted. **Which of the following is the most appropriate next step in management?**

- A. MRI examination of vertebral column
- B. NSAIDs and 2 days of bed rest
- C. Plain x-ray of the lumbosacral spine
- D. Radionuclide bone scanning
- E. Surgical consultation

The correct answer is B. The clinical picture strongly suggests herniation of an intervertebral disc causing compression of a spinal root (S1, considering radiation of the pain and reflex alterations). Supporting such a diagnosis is also the positive straight leg-raising test (Lasegue sign). When the history and physical examination support a diagnosis of disc herniation, conservative management is all that is needed. Current recommendations include treatment with NSAIDs and bed rest of short duration (no longer than 2 days). Longer periods of bed rest do not provide any additional benefit.

MRI examination of vertebral column (**choice A**) is certainly the diagnostic procedure of choice to visualize soft tissue structures of the vertebral column. MRI is reserved for cases in which more detailed imaging information would change the therapeutic approach.

Plain x-ray examination of the lumbosacral spine (**choice C**) provides nonspecific information. Almost any person older than 40 has some signs of degenerative joint disease of the lumbar column. Plain radiographs should be performed when the clinical symptomatology suggests diseases other than disc herniation, such as tumors or infections.

Radionuclide bone scanning (**choice D**) is useful in detecting foci of osteomyelitis or bone metastases, but not disc disease.

Surgical consultation (**choice E**) should be sought if the patient does not respond to appropriate treatment or if there are severe or evolving neurologic deficits. Percutaneous lumbar discectomy may be performed under local anesthesia as an alternative to laminectomy.

9. A 20 year old man began to note persistent lower back pain and stiffness that diminishes with activity. He also developed hip and shoulder arthritis, and he is bothered by decreased lumbar spine mobility. He has no other major medical problems. **Which of the following is the most likely diagnosis?**

- A. Ankylosing spondylitis
- B. Calcium pyrophosphate dihydrate deposition disease
- C. Lyme disease
- D. Osteoarthritis
- E. Rheumatoid arthritis

The correct answer is A. Ankylosing spondylitis. He probably is also HLAB27 positive. The earlier in life the disease begins, the worse the prognosis. There is a progressive bony ankylosis, especially of spine. RA typically involves small joints. Osteoarthritis typically involves a single large joint. Calcium pyrophosphate dehydrate deposition disease (Pseudogout) is more typical of the elderly and occurs in acute attacks.

10. A 50-year-old lady with severe rheumatoid arthritis has failed on most traditional DMARD treatments. She is currently on Methotrexate 20 mg weekly and for the last 6 months has been receiving regular infusions of the anti-TNF-alpha monoclonal antibody, Infliximab. Her joint disease has dramatically improved. She now presents with fever, pleuritic chest pain and a large left sided pleural effusion, but little evidence of joint synovitis. **What is the most likely diagnosis?**

- A. Primary bronchial carcinoma
- B. Pulmonary embolus
- C. Pulmonary metastases
- D. Rheumatoid related effusion
- E. Tuberculosis

The correct answer is E. The most likely answer is TB. All of the other answers are possible and need to be excluded. A rheumatoid effusion is unlikely when peripheral joint disease is so well controlled. Treatment with anti-TNF-alpha increases the risk of

opportunistic infections and in particular, there is a significant increase in the risk of TB reactivation in conjunction with Infliximab.

11. A 62-year-old hypertensive man presents with pain, redness and swelling in the right knee, which started 12 hours ago. There is a family history of hypertension and joint problems. **What investigation is most important in identifying the cause of this patient's knee symptoms?**

- A. ESR
- B. HLA status
- C. Joint aspiration
- D. Radiology
- E. Serology

The correct answer is C. This patient has an acute mono arthropathy with pain swelling and erythema of a single joint, this may be septic arthritis. He needs Joint aspiration for microscopy and culture to identify any infective organism so appropriate therapy can be guided. X ray is of no value in septic arthritis as it only becomes abnormal following joint destruction.

12. A 40-year-old man presents with acute monoarthritis of the right knee. Gout is confirmed following joint aspiration and examination of the fluid under polarized light microscopy. He underwent endoscopy 3 weeks earlier because of dyspepsia and this confirmed a duodenal ulcer. **Which of the following would be the best initial treatment for him?**

- A. Allopurinol
- B. Indomethacin alone
- C. Indomethacin and Lansoprazole
- D. Indomethacin and Misoprostol
- E. Intra-articular corticosteroid injection

The correct answer is E. All non-steroidal including Cox-I selective non-steroidal are contraindicated in the presence of active ulceration. Allopurinol should never be started in the presence of acute gout as the symptoms will be exacerbated. In a large joint such as the knee, the safest option would be to inject corticosteroid into the joint. Colchicine would also be an option but is associated with GI toxicity.

Rheumatology (MCQs)

13. A 55-year-old female receiving 10 mg of Methotrexate and 5mg of folate weekly presents with a sore right finger after cutting herself in the kitchen. On examination, she has a swollen, erythematous right ring finger up to the proximal interphalangeal joint and you diagnose a cellulitis. You give her a prescription for erythromycin as she is allergic to penicillins. She has been receiving the Methotrexate for just over one year with no problems and all routine blood monitoring has been normal. Whilst monitoring the response of the infection to treatment, **what is the most appropriate strategy regarding her Methotrexate therapy?**

- A. Continue Methotrexate and folate unchanged.
- B. Increase folate supplements to 10mg daily.
- C. Reduce dose of Methotrexate to 5mg weekly
- D. Stop Methotrexate only if full blood count reveals a neutropenia.
- E. Stop Methotrexate until the infection has resolved.

The correct answer is E. In the circumstances of infection, one should consider temporarily stopping methotrexate as it is an immunosuppressant. Any infection should be treated as usual and the response to treatment monitored. Once the infection has been successfully treated, methotrexate can be reinstated. However, if the patient has recurrent serious infections while taking methotrexate, long term use should be discussed with the patient's rheumatologist.

Some local variations may exist regarding dose and frequency of folate therapy. Please be aware of your local guidelines.

14. A 22-year-old female presents with a 6 month history of increasing fatigue and arthralgia of the wrists and ankles. More recently, she has also noted a symmetrical rash on her cheeks and some hair loss. **What is the most likely diagnosis?**

- A. Dermatomyositis
- B. Hypothyroidism
- C. Porphyria Cutanea Tarda
- D. Scleroderma
- E. Systemic lupus erythematosus

The correct answer is E. This woman has clinical features consistent with systemic lupus erythematosus. She gives a history of fatigue which occurs in almost all SLE patients. Arthralgia and arthritis are the most common presenting manifestations of SLE typically affecting the small joints of the hands, wrists and knees. The symmetrical rash is the classical butterfly rash that occurs in a malar distribution. Alopecia is common and may be diffuse or patchy. In dermatomyositis there is proximal, symmetrical muscle weakness that progresses over weeks to months. The typical lilac popular rash occurs over the dorsum of the metacarpophalangeal (Gottron's papules), elbows and knees. Hypothyroidism does not result in a symmetrical facial rash. The initial symptoms of scleroderma tend to be non-specific and may consist of fatigue, weakness, and musculoskeletal complaints. Raynaud's phenomenon is an early symptom. Skin changes include telangiectasia, hyper and hypo pigmentation. Sarcoidosis can present acutely with arthritis and erythema nodosum.

Rheumatology (MCQs)

15. A middle-aged man has had increasing back pain and right hip pain for the past 10 years. The pain is worse at the end of the day. He has bony enlargement of the distal interphalangeal joints. A radiograph of the spine reveals the presence of prominent osteophytes involving the vertebral bodies. There is sclerosis with narrowing of the joint space at the right acetabulum seen on a radiograph of the pelvis. **What is most likely diagnosis?**

- A. Gout
- B. Lyme disease
- C. Osteoarthritis
- D. Osteomyelitis
- E. Rheumatoid arthritis

The correct answer is C. Degenerative osteoarthritis is a common and progressive condition that becomes more frequent and symptomatic, with aging. There is erosion and loss of articular cartilage, Rheumatoid arthritis typically involves small joints of the hands and feet most severely, and there is a destructive pannus that leads to marked joint deformity. A gouty arthritis is more likely to be accompanied by swelling, and deformity with joint destruction. The pain is not related to usage. Osteomyelitis represents an ongoing infection that produces marked bone deformity, not just joint narrowing. Lyme disease produces a chronic arthritis, but it is typically preceded by a deer tick bite with a skin lesion. It is much less common than osteoarthritis.

16. A 42-year-old female with a recent diagnosis of systemic sclerosis, is referred to hospital with a complaint of headaches and blurred vision. She has a past medical history of asthma. On examination, her blood pressure is 230/120, and there is bilateral papilledema. **Which of the following medications should be prescribed immediately?**

- A. IV Furosemide
- B. IV Labetalol
- C. IV Sodium Nitroprusside
- D. Oral Enalapril
- E. Sublingual Nimodipine

The correct answer is D. Systemic sclerosis is a systemic disorder characterized by skin thickening due to the deposition of collagen in the dermis. Adverse prognostic features are renal, cardiac or pulmonary involvement. A major complication is the development of scleroderma renal crisis. This is characterized by the abrupt onset of severe hypertension, usually with retinopathy, together with rapid deterioration of renal function and heart failure. It develops in 8-15% of patients with diffuse systemic sclerosis, especially associated with rapid progression of diffuse skin disease. It usually presents early, within three years of diagnosis. The pathogenic mechanisms leading to renal damage are not known. The clinical presentation is typically with the symptoms of malignant hypertension, with headaches, blurred vision, fits and heart failure. Renal function is impaired and usually rapidly deteriorates. The hypertension is almost always severe with a diastolic BP over 100 mmHg in 90% of patients. There is hypertensive retinopathy in about 85% of patients, with exudates and hemorrhages and if severe, papilledema. Scleroderma renal crisis is a medical emergency. The hypertension should be treated with an ACE inhibitor. The aim is to reduce the blood pressure gradually, as an

Rheumatology (MCQs)

abrupt fall can lead to cerebral ischemia or infarctions (as in any accelerated hypertension). Calcium channel blockers may be added to ACE inhibitors. Deterioration in renal function can be rapid, with gross pulmonary edema; therefore patients with scleroderma renal crisis should be managed in hospitals with facilities for dialysis.

17. A 53-year-old woman with rheumatoid arthritis was referred with iron deficiency anaemia. Endoscopy revealed several superficial antral erosions, with small bowel biopsy showing mild villous blunting, occasional eosinophils and mild increase in chronic inflammatory cells. Colonoscopy was reported as normal. **What is the most likely cause of these findings?**

A. Coeliac disease
B. Crohn's disease
C. NSAIDs therapy
D. Small bowel lymphoma
E. Whipple's disease

The correct answer is C. This salient features in this patient's case revolve around the fact that she has rheumatoid arthritis (hence the requirement for NSAIDs), the iron deficiency anaemia and the superficial ulceration on endoscopy with features indicative of inflammation due to the chronic NSAID use. Coeliac disease is associated with villous atrophy and lymphocyte infiltration. There is no suggestion on the biopsy of lymphocyte infiltration which argues against lymphoma or celiac.

18. A 52-year-old female with type 2 diabetes presents with a two month history of painful hands and feet. Investigations confirm a diagnosis of sero-positive erosive rheumatoid arthritis. She has some pain relief from non-steroidal anti-inflammatory agents. She currently takes metformin 500 mg t.d.s. and has good glycemic control as reflected by HbA1c of 6.7%. **Which of the following would be most appropriate initial treatment?**

A. Cyclosporin
B. Etanercept
C. Hydroxychloroquine
D. IM Gold
E. Methotrexate

The correct answer is E. Guidance recommends the use of DMARDS early in the treatment of Rheumatoid arthritis maintaining function and reducing progression of the disease (SIGN 2001). First line agents include methotrexate and sulphasalazine (SIGN 2000) and most subjects receive Methotrexate; Generally-gold is considered more toxic than the former two and hydroxychloroquine is probably less effective. Cyclosporin is again rather more toxic than either methotrexate or sulphasalazine, with nephrotoxicity and immuno-suppression and is generally reserved for RA with systemic features such as vasculitis. The TNF alpha antagonists, etanercept and infliximab, are generally reserved for individuals unresponsive to traditional DMARDS.

Rheumatology (MCQs)

19. A 32-year-old woman is referred with shortness of breath, myalgia, arthralgia and a skin rash. SLE was suspected. **Which of the following antibodies is most specific?**

A. ANA
B. Anti-double stranded DNA
C. Anti-Ro
D. C-ANCA
E. Rheumatoid factor

The correct answer is B. The presence of Anti-double stranded DNA antibodies is more specific for SLE than antinuclear antibodies. Others are not specific for SLE.

20. A 35 year-old woman with systemic lupus erythematosus (SLE) controlled for the last 3 years, developed acute relapse. **Which of the following may be responsible for her condition?**

A. chlorpromazine
B. hydralazine therapy
C. Pregnancy
D. Progesterone only contraceptive pill
E. Salmeterol therapy

The correct answer is C. Some physiological and environmental factors affect the periods of deterioration and of remission in systemic lupus erythematosus. These factors include the oral contraceptive, pregnancy and infection. It would not be expected with the progesterone only oral contraceptive. A number of drugs (hydralazine, procainamide, isoniazid, chlorpromazine, D-penicillamine and methyl dopa) can result in drug-induced lupus in predisposed individuals. This can be differentiated from the idiopathic SLE on genetic and immunologic grounds. Furthermore, it is mild and reversible on stopping the drug, renal disease and double stranded anti-DNA are rare (although antibodies specific for histones may be present) and the sex ratio is equal. They do not cause deterioration in patients with SLE.

21. A 52-year-old female, with a three year history of sero-positive erosive rheumatoid arthritis, has recently commenced methotrexate therapy initiated at the rheumatology clinic. **Which one of the following agents should be added to her medications?**

A. Folic acid
B. Omeprazole
C. Thiamine
D. Vitamin C
E. Zinc supplements

The correct answer is A. Methotrexate is a chemotherapeutic agent as well as being an immunosuppressant used as a DMARD. Its action in arthritides is not entirely understood but may relate to both anti-inflammatory as well as immunomodulation. It acts through inhibition of dihydrofolate reductase thus depleting folate concentrations. To reduce the impact of folate deficiency, a dose of 5mg of folic acid weekly is recommended: in conjunction with methotrexate taking the agent at least two days prior to commencing the methotrexate.

22. A 51-year-old female was diagnosed to have rheumatoid arthritis. She states that she is allergic to Penicillin and Co-Trimoxazole. You think that she needs a Disease Modifying Drug. Which of the following drugs is contraindicated?

A. Azathioprine
B. Cyclosporin
C. Gold therapy
D. Methotrexate
E. Sulphasalazine

The correct answer is E. Both co-trimoxazole; and sulphasalazine are sulphonamide groups and hence an allergy to co-trimoxazole would be a contraindication to the use of sulphasalazine. Co-trimoxazole is a mixture of trimethoprim and sulfamethoxazole. Sulphasalazine is a combination of 5-aminosalicylic acid and sulfapyridine.

23. A 30-year-old male presents with a week history of a painful right leg. Past medical history reveals that he had erythema nodosum and recurrent oral and scrotal ulceration. Examination reveals a diffusely swollen left leg. What is the most likely cause?

A. Cellulitis
B. Lymphoedema
C. Pyomyositis
D. Ruptured Baker's cyst
E. Venous thrombosis

The correct answer is E. This man has clinical features of Behcet's Syndrome. He has had erythema nodosum (EN). 50% of patients with Behcet's have an episode of EN throughout the course of the disease. The condition is a systemic vasculitis characterized by recurrent aphthous ulcers, genital ulcers, uveitis, and skin lesions. Venous thrombosis is a characteristic manifestation of Behcet's. The most likely cause of this man's swollen leg is therefore venous thrombosis.

24. A 68-year-old woman complained of pain at the base of her right thumb. There was tenderness and swelling of the right first carpi-metacarpal joint. What is the most likely diagnosis?

A. Avascular necrosis of the scaphoid
B. De Quervain's tenosynovitis
C. Osteoarthritis
D. Psoriatic arthritis
E. Rheumatoid arthritis.

The correct answer is C. Osteoarthritis of the 1st carpometacarpal joint is extremely common and in a 68-year-old lady is the most likely diagnosis. Swelling is usually bony hard and due to osteophyte formation which can lead to the appearance of squaring of the hand. De Quervain's tenosynovitis is a common overuse condition which presents with pain at the base of the thumb but is not associated with joint swelling. This joint can be affected in rheumatoid arthritis and psoriatic arthritis but rarely on its own.

25. A 30-year-old woman presented with a deep vein thrombosis. Her previous history included investigation for repeated abortions. Investigations revealed:

Hemoglobin	12.8 g/dL
White blood count	$3.6 \times 10^9/L$
Platelet count	$35 \times 10^9/L$

Which of the following investigations is most likely to be abnormal?

A. Antiphospholipid antibodies.
B. Homocystine concentration
C. Indium-labeled white cells scan.
D. Platelet function test
E. Protein C concentration.

The correct answer is A. The suggestion is that this patient has a thrombophilia, with a low platelet and white cell count. Together with the repeated abortions a diagnosis of antiphospholipid syndrome is suggested. Although protein C deficiency is associated with thrombophilia, abortion is not a feature. Hyper homocystinemia is associated with arterial thrombosis.

26. A 50-year-old woman presents with dry eyes, a dry mouth, an erythematous rash and polyarthralgia. Investigations revealed:

Anti-nuclear antibody	Strongly positive (1:1600)
Anti-Ro/SSA antibodies	Strongly positive
Rheumatoid factor	Positive
IgG	45g/L (<15)
IgM	Normal
IgA	Normal
Kappa/lambda ratio	Normal

What is the most likely diagnosis?

A. Hyperviscosity syndrome
B. Myeloma associated vasculitis
C. Primary Sjogren's Syndrome
D. RA with secondary Sjogren's Syndrome
E. Systemic Lupus Erythematosus

The correct answer is C. The clinical features and the serology are typical of primary Sjogren's syndrome (occurs alone and more likely to have positive anti Ro SSA antibodies than secondary Sjogren's). Hypergammaglobulinemia is present in 80% of individuals. ANA and Anti-Ro/SSA antibodies are present in approximately 90% of individuals as is a weak positive rheumatoid factor. Typically secondary Sjogren's has pre-existent Rheumatoid or SLE before the development of Sjogren's symptoms.

27. A 62-year-old lady is suffering from pain and stiffness of her shoulders and difficulty getting out of a chair. A diagnosis of polymyalgia rheumatica is suspected. Which of the following would support your diagnosis?

- A. Ankle stiffness
- B. Low grade fever
- C. Muscle tenderness
- D. Proximal muscle weakness
- E. Weight gain

The correct answer is B. Polymyalgia rheumatica presents with early morning stiffness of the shoulder and pelvic girdles, fever, anorexia, weight loss and malaise. There is no muscle tenderness or weakness and the feet are never affected. Investigations may reveal normochromic / normocytic anaemia, raised ESR often > 50 mm/hr, raised ALP and raised CRP. Features of Giant Cell arteritis should be sought headache, visual disturbance, TIAs, jaw claudication and thickened, tender, pulseless temporal arteries. Diagnosis is by temporal artery biopsy and / or characteristic response to steroids.

28. A 31-year-old female presents with red scaly plaques on her cheeks, forehead and sides of the neck. On close inspection of the lesions there was plugging of some hair follicles with keratin and atrophy of the skin. What is the most likely diagnosis?

- A. Atopic Eczema
- B. Discoid lupus erythematosus
- C. Polymorphic light eruption
- D. Porphyria Cutanea Tarda
- E. Psoriasis

The correct answer is B. This woman has discoid lupus erythematosus. Lesions are discrete plaques, often erythematous, covered by scales that extend into dilated hair follicles. These lesions most typically occur on the face, scalp, in the pinnae, behind the ears and on the neck. They can exist in areas not exposed to the sun. The lesions can progress, with active indurated erythema at the periphery. Central atrophic scarring is characteristic. Amiodarone phototoxicity results in blue-grey skin pigmentation in sun-exposed areas. In eczema dryness and lichenification are predominant features. Psoriasis commonly appears as inflamed lesions covered with a silvery white scale. Polymorphic light eruption is characterized by recurrent, abnormal, delayed reactions to sunlight, ranging from erythematous papules, papulovesicles, and plaques to erythema multiforme like lesions on sunlight-exposed surfaces.

29. A 70-year-old man developed acute monoarthritis of his right ankle on the second postoperative day following an elective inguinal hernia repair. He was on a diuretic for hypertension. On examination his temperature was 38°C. What is the most likely diagnosis?

- A. Acute rheumatoid arthritis
- B. Gout
- C. Pseudogout
- D. Septic arthritis
- E. Traumatic synovitis

The correct answer is B. The most likely diagnosis is gout, given the history of recent surgery and diuretic use. Pyrophosphate arthropathy is less common, associated with deposition of pyrophosphate chiefly in the knees, second and third metacarpophalangeal joints and there may be a history of hemochromatosis. Rheumatoid arthritis most commonly manifests as a chronic polyarthritis and synovitis. Septicemia following an elective hernia repair would be uncommon as would traumatic synovitis. Gout is an inflammatory process and this is what causes the fever. Fever may even be the most prominent feature of an attack of gout. Acute gout is a cause of Systemic inflammatory response syndrome (SIRS) which is 2 or more changes of body temperature, heart rate, respiratory function, and peripheral leukocyte count.

30. A 17-year-old girl, who had completed treatment for acute lymphoblastic leukemia six months previously, presents with a short history of marked, right hip pain and associated limping. What is the most likely diagnosis?

- A. Avascular necrosis of the femoral head
- B. Gout
- C. Osteoarthritis
- D. Pseudogout
- E. Septic arthritis

The correct answer is A. Avascular necrosis of the femoral head can occur as a consequence of her treatment or the disorder itself. At age 17, osteoarthritis is particularly unlikely. Gout too is unlikely (considering she completed treatment six months ago) unless she had relapsed (high white cell count) or had some other risk factors. She would be considered to be no more likely to get septic arthritis or pseudogout than anyone who had not previously had acute lymphoblastic leukemia, if in remission.

31. A 40 year-old woman presents with a year history of Raynaud's phenomenon, dyspepsia and arthralgias. On examination she has sclerodactyly and synovitis of the small joints of the hands. Her ESR is 40 mm/hr but Rheumatoid factor and Antinuclear Antibody are both negative. Which complication is most likely to develop?

- A. Anterior uveitis
- B. Butterfly rash
- C. Erosive joint disease
- D. Erythema nodosum
- E. Malabsorption

The correct answer is E. This woman has features of a mixed connective tissue

Rheumatology (MCQs)

disorder like CREST/systemic sclerosis with sclerodactyly, Raynaud's, dyspepsia and arthralgia. The absence of ANA found in 90% of systemic sclerosis makes this diagnosis less likely and these antibodies plus Anti-centromere antibodies are also associated with CREST. The most likely development would be a malabsorption which is associated with hypomotility of the small intestine. Erosive arthropathy is rare as is uveitis, with Kerato conjunctivitis sicca being more common.

32. A 55-year-old woman on treatment for long-standing rheumatoid arthritis has recently become dyspneic on mild exertion and developed a dry cough. The oxygen saturation was found to be 87% on air. The chest x-ray showed a diffuse bilateral interstitial infiltrate. An extensive infection screen was negative and her symptoms were felt to be drug-induced. Which drug is most likely to have caused this adverse effect?

A. azathioprine
B. cyclosporin
C. hydroxychloroquine
D. methotrexate
E. sulphasalazine

The correct answer is D. Methotrexate is a well recognized cause of acute pneumonitis and interstitial lung disease. It is a rare, complication of methotrexate therapy but is often fulminant and can be fatal.

33. A 42-year-old woman presents with a six month history of dyspepsia. She has a 3 year history of Raynaud's phenomenon. On examination she had telangiectasia. Her investigations reveal an ESR of 40 mm/hr and positive anti centromere antibodies. Which of the following is a typical late complication?

A. Alopecia
B. Butterfly skin rash
C. Erosive polyarthropathy
D. Myositis
E. Pulmonary hypertension

The correct answer is E. Limited scleroderma is characterized by Raynaud's phenomenon, peripheral skin involvement, skin calcification, telangiectasia, nail fold capillary dilatation and anti-centromere antibodies in 70-80% of patients. Pulmonary hypertension with or without interstitial lung disease is a characteristic late complication of this disorder.

Rheumatology (MCQs)

34. A 52-year-old woman presents with left loin pain. Past history included hypertension and progressive cognitive decline. On examination she was pyrexial, had livedo reticularis and a blood pressure of 180/100 mmHg. Examination of the abdomen revealed no masses but there was tenderness in the left flank. Investigations revealed:

Hemoglobin 12.9 g/dL
White cell count $8.7 \times 10^9/L$
Platelet count $83 \times 10^9/L$
Serum creatinine 1.5 mg/dl
Urine dipstick analysis: blood+++, protein+

Which one of the following tests is most likely to be positive?

A. Anticardiolipin antibody
B. Antiglomerular basement membrane antibody
C. Antimitochondrial antibody
D. Antineutrophil cytoplasmic antibody
E. Antistreptolysin O antibody

The correct answer is A. This patient has features of to suggest SLE with antiphospholipid syndrome with this presentation possibly due to renal vein thrombosis (flank pain with blood and protein in urine). The diagnosis would be supported by the thrombocytopenia, history of hypertension and the livedo reticularis. Wagner's with positive ANCA would be a less likely diagnosis.

35. A 70-year-old female who has a history of chronic anxiety presents with a 3 day history of severe left temporal headache radiating from the eye to the scalp. She had also experienced discomfort during eating. Which one of the following drugs should be given to this patient while awaiting the results of diagnostic tests?

A. Acyclovir
B. Carbamazepine
C. Diclofenac
D. Prednisolone
E. Sumatriptan

The correct answer is D. The history suggests temporal arteritis irrespective of the history of anxiety and in view of the sight threatening nature of the disease; the patient should be commenced on steroids. Although the differential diagnosis is also trigeminal neuralgia steroids should be used here whilst awaiting diagnostic investigations as temporal arteritis may be sight threatening if left untreated.

Rheumatology (MCQs)

36. A 55 year old male has been taking Methotrexate 7.5 mg weekly for sero-negative erosive rheumatoid arthritis with considerable clinical and symptomatic improvement. His most recent investigations performed two days ago reveals the following:

Hemoglobin	12.9 g/dL
White blood count	$5.3 \times 10^9/L$
Platelets	$183 \times 10^9/L$
Urea	30 mg/dl
Creatinine	0.9 mg/dl
Alkaline phosphatase	92 U/L (60-110)
AST	22 U/L
ALT	15 U/L

When should the next series of blood tests be performed?

- A. One week
- B. Two weeks
- C. One month
- D. Six months
- E. One year

The correct answer is C. His results are normal and he is receiving a stable dose of Methotrexate. The most appropriate time interval for monitoring his profiles would therefore be in one month. This should include FBC, Creatinine and AST/ALT. Similarly, the British Society of Rheumatology suggests monthly FBC when the results are stable.

37. A 45-year-old male attends for medical insurance and is in good health. Examination was normal but investigations reveal that he has a serum uric acid concentration of 7mg/dl. Which of the following is the most appropriate management for this patient?

- A. Lifestyle advice
- B. Start Allopurinol
- C. Start Colchicine
- D. Start Diclofenac
- E. Start Prednisolone

The correct answer is A. The most appropriate treatment for this asymptomatic man with an isolated slightly elevated uric acid is lifestyle advice with an appropriately reduced purine diet, increased exercise and reduced alcohol consumption.

Rheumatology (MCQs)

38. A 26-year-old male presents with a three month history of arthralgia, mouth ulceration and eye irritation. On examination he was afebrile, had some ulceration of the mouth, bilaterally swollen wrists and effusions with reduced range of movements of both knees. Examination of the external genitalia revealed a scrotal ulcer. His investigations showed:

White cell count	$12 \times 10^9/L$
C-reactive protein	120mg/L (<10)
Rheumatoid factor	Negative

What is the most likely diagnosis?

- A. Behcet's syndrome
- B. Inflammatory bowel disease
- C. Psoriatic arthritis
- D. Reiter's syndrome
- E. Sjogren's syndrome

The correct answer is A. This man has Behcet's on the basis of his oro-genital ulceration and oligoarthritis. Behcet's syndrome is a multisystem disorder characterized by recurrent oral and genital ulceration, eye lesions (anterior or posterior uveitis or retinal vasculitis), skin lesions, (erythema nodosum, papulopustular lesions or folliculitis) and a positive pathergy test. Other features include musculoskeletal involvement with a mono or oligo arthropathy, venous thromboembolism, neurological and gastrointestinal features.

Reiter's syndrome is a clinical triad of urethritis, conjunctivitis and arthritis after infective dysentery.

Genital ulceration is not a feature of systemic lupus erythematosus, rheumatoid arthritis or Sjogren's syndrome.

39. A 73-year-old female presents with difficulty opening jars and bottles. On examination there was tenderness with crepitus and bony swelling over the base of the first metacarpal and wasting of the right thenar eminence. Investigations revealed an ESR of 30 mm/1st hr, a C-reactive protein of 8mg/L (<10), a Urate concentration of 4mg/dl and her Rheumatoid factor was 60IU/L (<30). An x-ray of the right hand showed a loss of the joint space with articular sclerosis and osteophytes of the first carpometacarpal joint. What is the most likely diagnosis?

- A. De Quervain's tenosynovitis
- B. Gouty arthritis
- C. Osteoarthritis
- D. Pyrophosphate arthritis
- E. Rheumatoid arthritis

The correct answer is C. This woman has clinical and radiological features consistent with osteoarthritis (OA) of the 1st right carpometacarpal (CMC) joint. OA is characterized by joint pain, crepitus, and stiffness after mobility, and limitation of motion. The CMC joint is involved in gripping and twisting. The clinical joint symptoms are associated with defects in the articular cartilage and underlying bone, outlined in this woman's x-ray findings. Joint swelling is bony in nature, unlike the

boggy swelling which occurs in inflammatory arthritis. This woman's ESR is not significantly raised and her CRP is within normal range making an inflammatory arthritis unlikely. A positive rheumatoid factor does not make the diagnosis of rheumatoid arthritis. The frequency of positive rheumatoid factor in normal individuals of age > 70 is up to 10-20%. Thenar wasting occurs in OA of the 1st CMC joint due to disuse.

40. A 65-year-old man complains of bone pain especially in his spine. X-ray revealed lytic lesions in the vertebrae and skull. He also had anaemia and hypercalcemia. Which of the following is least likely to be present in this patient?

- A. Bence Jones proteins
- B. Decreased resistance to infection
- C. Infiltration of flat bones by plasma cells
- D. Macroglobulinemia
- E. Monoclonal gammopathy

The correct answer is D. This is multiple myeloma. All others except Macroglobulinemia are typical of multiple myeloma.

41. A 47-year-old woman presented with several years several years history of dysphagia, hard calcified nodules in the fingers, and cold hands. Examination revealed calcified nodules, sclerodactyly and facial telangiectasia. Which one of the following antibodies is most likely to be found in the blood?

- A. Anti cardiolipin
- B. Anti centromere
- C. Anti-DNA antibodies
- D. Anti mitochondrial
- E. Anti myeloperoxidase

The correct answer is B. This patient has CREST syndrome which consists of calcinosis, Raynaud's phenomenon, esophageal dysmotility, Sclerodactyly and Telangiectasia. It is a limited form of scleroderma with less involvement of internal organs and is better referred to as "Cutaneous limited systemic sclerosis".

42. A 25-year-old student presents to casualty with a systemic illness. She appears unwell, with a swinging fever, 3kg weight loss over 2 months, generalized myalgia, polyarthralgia affecting wrists, knees, ankles, elbows and metacarpophalangeal joints, and a sore throat. Investigations demonstrate normochromic normocytic anaemia 9.8 g/dl, ESR 81 mm in the first hour, CRP 31 g/l, serum ferritin 1756 mg/dl, RF negative, ANA negative, ENA negative, ASO titre <200 IU. What is the most likely diagnosis?

- A. Adult onset Still's disease
- B. Polymyositis
- C. Rheumatic fever
- D. Seronegative rheumatoid arthritis
- E. Systemic lupus erythematosus

The correct answer is A. The clinical scenario fulfills the diagnostic criteria for Adult onset Still's disease. The fever occurs once or twice daily and is described as quotidian

returning to 37°C or below between episodes. The characteristic evanescent salmon-colored non-pruritic macular or macular-papular rash occurs in approximately 90% of patients and is often only seen when the patient is febrile and is easily missed. A very high serum ferritin level commonly occurs in AOSD but is not diagnostic, as ferritin levels of this magnitude can also occur in sepsis and in tuberculosis.

43. A 73-year-old male presented with an acute attack of gout in his left knee. You search for any precipitating factor. What is the most likely underlying metabolic cause?

- A. Decreased renal excretion of uric acid
- B. Endogenous overproduction of uric acid
- C. Excessive dietary purine intake
- D. Lactic acidosis
- E. Starvation

The correct answer is A. The aetiology of gout can broadly be divided into cases where there is under excretion of urate via the kidney (90%) or endogenous overproduction of uric acid (10%) although in practical terms the distinction is rarely made as it allopurinol is the mainstay of long-term treatment (not during the acute attack) in both groups. In a 73-year-old man it is almost certainly reduced renal excretion due to deteriorating renal function and possibly diuretic use. Excessive dietary intake of purines is unlikely to be the main cause in this case.

44. A 31-year-old nurse present with chronic pain. The pain changes from day to day, but often focuses in the lower back. She is pale and looks unwell. She complains of waking up frequently at night, and feels not refreshed in the morning. She also complains of intermittent constipation and diarrhoea. Examination is essentially normal but the patient complains of tenderness in multiple areas. Basic blood tests are normal. What is the most likely diagnosis?

- A. Depressive disorder
- B. Fibromyalgia
- C. Hypothyroidism
- D. Schizophrenia
- E. Somatoform disorder

The correct answer is B. Fibromyalgia is becoming a recognized medical diagnosis, and is based on the presence of pain in all four quadrants of the body, as well as tenderness in 11 of 18 anatomically defined trigger areas. Approximately 50% of patients with fibromyalgia complain of diarrhoea and constipation, often associated with abdominal bloating. Morning fatigue is present in a large proportion of these patients, and patients often look unwell, and may appear depressed and anxious. Other features include tissue swelling, morning stiffness and sleep disorders.

45. A 28-year-old woman presents with a 3 month history of arthralgia. She had no past medical history of note. Examination reveals swelling of the distal interphalangeal joints of the middle and ring fingers of the hand and wrist on the right plus a swollen left ankle. ESR 40 mm/hr. Which of the following is the most likely diagnosis?

- A. Acute exacerbation of osteoarthritis
- B. Psoriatic arthropathy
- C. Reactive arthritis
- D. Rheumatoid arthritis
- E. Systemic lupus erythematosus

The correct answer is E. Intense tendonitis is more common than synovitis and can lead to deforming reversible subluxation of joints without erosive disease (Jaccoud's arthropathy). This condition may affect the hands in up to 50% of patients with systemic lupus erythematosus. It is characterized by reducible, non-erosive joint deformities with a preservation of hand function. This condition is probably the result of tendon inflammation and shortening. It may also occur as a rare complication of recurrent attacks of rheumatic fever. A short, striking history of marked, acute polyarticular symptoms occurs with systemic (viral) infection.

46. A 35-year-old female presents with malaise, thirst and increasing nocturia over the last month. Six months ago she attended ER with an episode of renal colic. One month previously her GP had noted an eruptive, painful, erythematous rash on the anterior shins, which was self-limiting. What is the likely cause of her symptoms?

- A. Osteoarthritis
- B. Psoriatic arthritis
- C. Reactive arthritis
- D. Rheumatoid arthritis
- E. Systemic lupus erythematosus

The correct answer is B. This woman is most likely to have psoriatic arthritis. Psoriatic arthritis has been sub classified according to different patterns of arthritis: asymmetrical oligoarthritis, symmetric polyarthritis, spondyloarthropathy, and arthritis mutilans. In about 20% of patients there is a chronic, progressive, and deforming arthropathy with an asymmetrical pattern, including: distal interphalangeal joint involvement. Osteoarthritis in this age group is unlikely. Rheumatoid arthritis is a symmetrical arthritis typically affecting the metacarpophalangeal joints bilaterally. Arthritis does occur in systemic lupus erythematosus; however there are several other clinical features that form part of the diagnostic criteria. Viral arthritis is self-limiting.

47. An 18-year-old male presents with a 6 week history of a painful swollen right knee. He had been treated for a sexually transmitted disease 3 months ago. On examination there was a large effusion in the right knee. Synovial fluid analysis revealed a white cell count of $16 \times 10^9 / L$ but culture was negative. Which one of the following organisms is the most likely cause?

- A. Chlamydia trachomatis
- B. Herpes simplex
- C. Neisseria gonorrhea
- D. Treponema Pallidum
- E. Trichomonas vaginalis.

The correct answer is C. Bacteria are the most common cause of monoarthritis. Staphylococcus aureus and gonococci are the most common causes of septic arthritis. Neisseria gonorrhea occurs in young adults and is often preceded by a migratory tendonitis or arthritis. Gram's stain is positive in 25% and culture positive in 50%. This patient has been treated previously for a sexually acquired infection and this may be why the culture is negative.

48. A 45-year-old man has noted pain in his right knee for several years. There is no joint swelling. As he moves about during the day, the pain decreases. What is the most likely diagnosis?

- A. Osteoarthritis
- B. Osteochondroma
- C. Osteomalacia
- D. Osteopetrosis
- E. Osteoporosis

The correct answer is A. Osteoarthritis usually involves large joints. The pain usually diminishes with movement; but recurs with reuse or prolonged use of the affected joint. Osteoporosis would be uncommon in a 45-year-old male. Back pain is a more typical symptom for Osteoporosis. Osteochondroma could be located about the knee, but the pain would probably be exacerbated by movement or local trauma. The findings with osteomalacia would be similar to Osteoporosis, and back pain would be more typical. Osteopetrosis, an uncommon inherited metabolic disorder, leads to 'brittle bones that predispose to fractures.

49. A 16-year-old girl presents with a 3 month history of polyarthralgia and marked early morning stiffness. Her symptoms respond well to Diclofenac but she is becoming increasingly concerned about her symptoms which appear to be progressing. She is otherwise well apart from a history of acne which is well controlled on Minocycline. Her mother has severe rheumatoid arthritis. Investigations revealed:

ESR	50 mm/hr
CRP	100 mg/L (< 10)
Rheumatoid factor	Negative
ANA	Strongly positive (1: 1600)
Anti-dsDNA antibodies	Negative
IgG	25 g/L (<15)

What is the most likely cause?

- A. Drug-induced SLE
- B. Fibromyalgia
- C. Rheumatoid arthritis
- D. Sero-negative spondyloarthropathy
- E. Systemic Lupus Erythematosus

The correct answer is A. The history strongly suggests inflammatory problems and the elevated ESR and CRP confirm this. Rheumatoid-arthritis and connective tissue disorders such as SLE would be on the differential-diagnosis. The serology is atypical for rheumatoid arthritis and the marked elevation of the CRP would be very unusual for SLE where characteristically, CRP elevation indicates underlying bacterial infection or widespread Serositis. The most likely diagnosis is drug-induced SLE. Minocycline has been well documented as a cause of drug-induced SLE. Characteristically, the ESR and CRP are both markedly elevated, the ANA is strongly positive and there is a hypergammaglobulinemia. Anti-dsDNA antibodies are usually negative. Symptoms usually improve following withdrawal of the drug but can take several months to resolve.

50. An 81-year-old female presents with bilaterally painful knees. There was no history of gastrointestinal diseases. On examination she had crepitus but had a full range of movement of both knees. Which one of the following is the most appropriate initial treatment?

- A. Celecoxib
- B. Dihydrocodeine
- C. Naproxen
- D. Paracetamol
- E. Topical Diclofenac

The correct answer is D. This woman has osteoarthritis (OA) of the knees. The principle goal of systemic therapy is to provide the most effective pain relief with the least associated toxicity. Paracetamol is the initial therapy recommended for the treatment of OA of the hip and knee. Studies have shown that the short-term and long-term efficacy of paracetamol is comparable with that of ibuprofen and naproxen in people with knee osteoarthritis. Specific COX-2 inhibitors such as celecoxib have

clinical benefit similar to that of traditional NSAIDs, but less GI toxicity although issues remain regarding their cardiovascular risk. They may be used in patients with GI intolerance of traditional NSAIDs.

Extended Matching Questions (EMQs)

1. Arthritis

- | | |
|--------------------------------|---------------------------------|
| A. Ankylosing spondylosis | H. Polymyalgia rheumatic |
| B. Cervical spondylosis | I. Psoriatic arthritis |
| C. Discoid lupus erythematosus | J. Reiter's syndrome |
| D. Gout | K. Rheumatoid arthritis |
| E. Lumbar spondylosis | L. Septic arthritis |
| F. Osteoarthritis | M. Sjögren's syndrome |
| G. Osteoporosis | N. Systemic lupus erythematosus |

For each clinical scenario below, give the most likely cause for the clinical findings. Each option may be used only once.

1. A 54-year-old woman presents with swollen painful hands and feet, which are stiffer in the mornings. On examination there are signs of ulnar deviation and subluxation at the metacarpophalangeal (MCP) joints.
2. A 65-year-old woman complains of pain in her fingers on movement, which is worst at the end of the day. On examination there is joint tenderness and bony lumps at the distal interphalangeal (DIP) joints. A radiograph shows loss of joint space.
3. A 30-year-old woman complains of joint pain in her hands and feet. Her chest radiograph shows reduced lung volumes.
4. A 22-year-old man presents with an acute arthritis of the left knee, dysuria and bilateral conjunctivitis. He has recently suffered from gastroenteritis.
5. A 45-year-old woman presents with bilateral painful deformed DIP joints. Examination reveals discoloration and onycholysis of the nails.

Answers: K F N J I

1. A 54-year-old woman presents to with swollen painful hands and feet, which are stiffer in the mornings. On examination there are signs of ulnar deviation and subluxation at the MCP joints.
Answer is K: Ulnar deviation and subluxation of MCP joints are signs of advanced disease. Swelling of the fingers (sausage-like) and MCP joint swelling are earlier signs.
2. A 65-year-old woman complains of pain in her fingers on movement, which is worst at the end of the day. On examination there is joint tenderness and bony lumps at the DIP joints. A radiograph shows loss of joint space.
Answer is F: The radiological changes of osteoarthritis include loss of joint space, subchondral sclerosis, osteophytes and subchondral cyst formation. Osteophytes at the proximal interphalangeal and DIP joints are called Bouchard's and Heberden's nodes respectively. Previous joint damage is a risk factor for the development of osteoarthritic disease. Simple analgesics such as paracetamol should be prescribed for pain relief rather than long courses of non-steroidal anti-inflammatory drugs (NSAIDs) (risk of gastrointestinal bleeding with prolonged use).
3. A 30-year-old woman complains of joint pain in her hands and feet. Her chest radiograph shows reduced lung volumes.
Answer is N: Systemic lupus erythematosus (SLE) is an inflammatory multisystemic disorder that is nine times more common in women than in men. The joints are most often affected in a symmetrical fashion with no bony erosion (unlike rheumatoid arthritis). Rarely, there may be markedly deformed joints caused by joint laxity that resemble rheumatoid arthritis (Jaccoud's arthropathy). Lung involvement occurs in up to half of patients with SLE. Manifestations include pleuritic chest pain, pleural effusions (these are common and often bilateral), acute/chronic pneumonitis and the rare 'shrinking lung syndrome'.
4. A 22-year-old man presents with an acute arthritis of the left knee, dysuria and bilateral conjunctivitis. He has recently suffered from gastroenteritis.
Answer is J: Reiter's disease involves a triad of urethritis, conjunctivitis and seronegative arthritis. Joint symptoms may be the presenting complaint. It is often triggered by an infection, e.g. a sexually transmitted infection or gastroenteritis. Cutaneous manifestations include keratoderma blennorrhagica, circinate balanitis and mouth ulcers. Enthesitis causing plantar fasciitis is also well recognized.
5. A 45-year-old woman presents with bilateral painful deformed DIP joints. Examination reveals discoloration and onycholysis of the nails.
Answer is I: Psoriatic arthritis is one of the seronegative spondyloarthritides. It is important to remember that the skin manifestations may occur subsequent to joint involvement. The patient in the question shows a typical presentation of DIP joint involvement with signs of nail dystrophy. Radiologically, the affective joints show central erosion rather than the juxtaarticular involvement that is seen in rheumatoid arthritis. About 5 per cent of patients with psoriasis may present with marked deformity in the fingers caused by severe periarticular osteolysis. This is known as arthritis mutilans.

2. Arthritis

- A. Erythema nodosum
- B. Gout
- C. Hemarthrosis
- D. Hyperparathyroidism
- E. Osteoarthritis
- F. Psoriatic arthropathy

- G. Pyrophosphate arthropathy
- H. Rheumatoid arthritis
- I. Septic arthritis
- J. Seronegative arthritis
- K. Systemic lupus erythematosus

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 77-year-old woman presents with pain and varus deformity of both knees. She also complains of pain in both hips and hands.
2. A 72-year-old woman presents with pain in both knees. Knee radiography shows a rim of calcification of the lateral meniscus.
3. A 30-year-old woman presents with pain and morning stiffness of the small joints of both hands.
4. A 30-year-old flight attendant presents with gritty eyes, dysuria and painful knees especially during standing. He has just returned from Thailand.
5. A 78-year-old man presents with pain and swelling of the left first metatarsophalangeal joint. He was started on Thiazide diuretics 3 weeks earlier.

Answers: E G H J B

1. A 77-year-old woman presents with pain and varus deformity of both knees. She also complains of pain in both hips and hands.

Answer is E: OA commonly affects the hands, feet, spine and the large weightbearing joints, such as the hips and knees. As OA progresses, the affected joints appear larger, are stiff and painful, and usually feel worse the more they are used throughout the day, thus distinguishing it from rheumatoid arthritis. In smaller joints, such as at the fingers, hard bony enlargements, called Heberden's nodes (on the distal interphalangeal joints) and/or Bouchard's nodes (on the proximal interphalangeal joints) may form.

2. A 72-year-old woman presents with pain in both knees. Knee radiography shows a rim of calcification of the lateral meniscus.

Answer is G: Pyrophosphate arthropathy (chondrocalcinosis) is due to the accumulation of crystals of calcium pyrophosphate dihydrate in the connective tissues. Diseases associated with chondrocalcinosis include Wilson's disease, osteoarthritis, hyperparathyroidism, Hemochromatosis, hypophosphatemia and renal osteodystrophy. Radiologically, a dense line within the hyaline cartilage parallels the articular surface.

3. A 30-year-old woman presents with pain and morning stiffness of the small joints of both hands.

Answer is H: Rheumatoid arthritis typically manifests with signs of inflammation, with the affected joints being swollen, warm, painful and stiff, particularly early in the morning on waking or following prolonged inactivity. Increased stiffness early in the morning is often a prominent feature of the disease and typically lasts for more than an hour.

4. A 30-year-old flight attendant presents with gritty eyes, dysuria and painful knees especially during standing. He has just returned from Thailand.

Answer is J: Seronegative arthritis is a classification given to the group of joint conditions with similar features to rheumatoid arthritis, but affecting different joints and lacking the specific autoantibodies used to identify rheumatoid arthritis. Rheumatoid arthritis is prevalent in the female population, whereas seronegative arthritis is more frequently seen in males. This is a case of Reiter's syndrome, which is mostly triggered by chlamydia or gastroenteritis.

5. A 78-year-old man presents with pain and swelling of the left first metatarsophalangeal joint. He was started on Thiazide diuretics 3 weeks earlier.

Answer is B: Pain and swelling at the first Meta tarso phalangeal joint should always be suspected as gout and investigated accordingly. Thiazide diuretics can trigger acute gout.

3. Joint Pain

- A. Gout
- B. Hemarthrosis
- C. Lumbar spondylosis
- D. Osteoarthritis
- E. Osteoporosis
- F. Osteosarcoma
- G. Polymyalgia rheumatic

- H. Polymyositis
- I. Pseudogout
- J. Psoriatic arthritis
- K. Reiter's syndrome
- L. Rheumatoid arthritis
- M. Septic arthritis
- N. Systemic lupus erythematosus

For each clinical scenario below, give the most likely cause for the clinical findings. Each option may be used only once.

1. A 64-year-old patient who has recently been started on medication for hypertension presents with a very painful, hot, swollen metatarsophalangeal joint. ☐
2. A 12-year-old hemophiliac presents to ER with severe pain after falling over and banging his right knee. ☐
3. A 55-year-old man presents to ER with fever and an exquisitely painful right knee. On examination his right knee is red, hot and swollen. Purulent fluid is aspirated from the joint. ☐
4. A 60-year-old woman presents with a painful swollen knee. Her radiograph shows chondrocalcinosis and joint aspiration reveals presence of weakly positive birefringent crystals. ☐
5. A 65-year-old woman presents with a 1-month history of pain and stiffness in her shoulders, worse in the mornings. She says that she was treated in hospital last year for headache and jaw pain. ☐

Answers: A B M I G

1. A 64-year-old patient who has recently been started on medication for hypertension presents with a very painful, hot, swollen metatarsophalangeal joint.
Answer is A: Gout is associated with hyperuricemia and therefore acute attacks may be precipitated by impaired excretion/increased production of uric acid. Drugs that impair the excretion of uric acid include Thiazide diuretics and aspirin. States of increased cell turnover and thus increased purine turnover, e.g. myelo-/lymphoproliferative states or carcinoma, can predispose to gout. Obesity, diabetes mellitus, high alcohol intake and hypertension are associated with hyperuricemia.

2. A 12-year-old hemophiliac presents to ER with severe pain after falling over and banging his right knee
Answer is B: Bleeding into the joint (hemarthrosis) may occur in all patients but is more common in those with acquired/inherited disorders of coagulation such as hemophilia.

3. A 55-year-old man presents to ER with fever and an exquisitely painful right knee. On examination his right knee is red, hot and swollen. Purulent fluid is aspirated from the joint.

Answer is M: The differential diagnosis of a monoarthritis is septic arthritis, osteoarthritis, crystal-induced arthritis, or trauma-related or a single joint manifestation of a multi-joint disease. Septic arthritis is a medical emergency and so, when a patient presents with a red, hot, swollen knee, treatment for any other possible diagnosis must not be initiated before septic arthritis is excluded. The joint space should be aspirated and the fluid sent for urgent Gram staining and culture as soon as possible.

4. A 60-year-old woman presents with a painful swollen knee. Her radiograph shows chondrocalcinosis and joint aspiration reveals presence of weakly positive birefringent crystals.
Answer is I: Pseudogout refers to the acute synovitis caused by the deposition of calcium pyrophosphate crystals into a joint. The knee and the wrist are the two most commonly affected sites. Diagnosis is made by detection of crystals that are weakly positively birefringent in plane polarized light. Risk factors include hypovolemia, hyperparathyroidism, diabetes, hemochromatosis, acromegaly and any other pre-existing arthritis.

5. A 65-year-old woman presents with a 1-month history of pain and stiffness in her shoulders, worse in the mornings. She says that she was treated in hospital last year for headache and jaw pain.
Answer is G: Polymyalgia rheumatica is associated with giant cell arteritis and is very rare before the age of 50 years. Patients also often complain of fatigue and depression. It is often associated with a high erythrocyte sedimentation rate (ESR). Oral prednisolone is the treatment of choice.

4. Rheumatological conditions

- A. Ankylosing spondylitis
- B. Behçet's disease
- C. Polymyalgia rheumatica
- D. Polymyositis
- E. Primary Raynaud's disease
- F. Reiter's syndrome
- G. Relapsing polychondritis

- H. Rheumatoid arthritis
- I. Sjögren's syndrome
- J. Stevens-Johnson's syndrome
- K. Syphilis
- L. Systemic Lupus Erythematosus
- M. Systemic sclerosis

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 45-year-old woman complains of cold numb fingers and difficulty in swallowing. On examination she has tight skin, thickening of the fingers and telangiectasia.
2. A 51-year-old woman complains of weakness in her shoulders and thighs. She has a significantly raised creatine kinase (CK) level.
3. A 25-year-old man has been referred to rheumatology clinic with multiple painful stiff joints and uveitis. He also complains of ulcers on his penis and mouth.
4. A 45-year-old woman presents with dryness in the eyes and mouth. Her Schirmer's test is positive.
5. A 36-year-old woman complains of recurrent chest pain, which is worse on inspiration, and progressive breathlessness. She also suffers from Raynaud's phenomenon. On examination she has a butterfly rash, and a pericardial rub is audible.

Answers: M D B I L

1. A 45-year-old woman complains of cold numb fingers and difficulty in swallowing. On examination she has tight skin, thickening of the fingers and telangiectasia.
Answer is M: Tight skin gives rise to the 'beak' nose and small mouth aperture (microstomia). Limited scleroderma is associated with the presence of anti-centromere antibodies. The term 'CREST syndrome' was the previous name for limited cutaneous scleroderma because it summarized the signs of calcinosis, Raynaud's phenomenon, esophageal dysmotility, sclerodactyly and telangiectasia that can be found in affected patients. Diffuse scleroderma is characterized by edema and extensive sclerosis which can involve most of the body including major organs, e.g. heart, lungs, kidneys. Diffuse scleroderma is associated with the presence of anti-topoisomerase and anti-RNA antibodies.
2. A 51-year-old woman complains of weakness in her shoulders and thighs. She has a significantly raised CK level.
Answer is D: Polymyositis is an autoimmune condition characterized by a non-suppurative inflammation of striated muscle that gives rise to a symmetrical proximal myopathy. Unlike other causes of pain and weakness (e.g. polymyalgia rheumatica) CK is characteristically elevated. Electromyography (EMG) shows fibrillation potentials in this condition. Dermatomyositis describes polymyositis associated with a heliotrope (purple) rash on the cheeks and other areas of skin exposed to sunlight. Dermatomyositis is associated with an increased risk of malignancy. Treatment is with steroids and other immunosuppressive agents.
3. A 25-year-old man has been referred to rheumatology clinic with multiple painful stiff joints and uveitis. He also complains of ulcers on his penis and mouth.
Answer is B: Behçet's disease is an inflammatory disorder of unknown aetiology characterized by signs of oro-genital ulceration and eye lesions, e.g. uveitis, retinal vein occlusion. A positive skin pathergy test is pathognomonic. A positive result involves the development of a pustule on the skin within 24 h of being pricked at that exact point with a sterile needle. Erythema nodosum is a recognized cutaneous manifestation of Behçet's disease. Neurological manifestations of Behçet's disease include meningo-encephalitis, dementia and cerebral vein occlusion. Behçet's disease is managed with immunosuppressants, e.g. corticosteroids, cyclosporin.
4. A 45-year-old woman presents with dryness in the eyes and mouth. Her Schirmer's test is positive.
Answer is I: Primary Sjögren's syndrome (SS) is characterized by symptoms of dry eyes (xerophthalmia) and dry mouth (xerostomia). Secondary SS describes the above symptoms in the presence of other autoimmune disease processes, e.g. rheumatoid arthritis. Anti-Ro antibodies are found in 75 per cent of patients with primary SS but only 10–15 per cent patients with secondary SS. A Schirmer's test can be used to identify insufficient production of tears. The test involves placing a strip of filter paper on the inside of the lower lid. A wetting (measured by the distance the water is absorbed up the paper) of less than 10 mm in 5 min implies defective tear production. Salivary gland biopsy to identify the focal infiltrate of lymphocytes is the best single test for diagnosis. Management involves treating the symptoms with artificial tears and saliva.
5. A 36-year-old woman complains of recurrent chest pain, which is worse on inspiration, and progressive breathlessness. She also suffers from Raynaud's phenomenon. On examination she has a butterfly rash, and a pericardial rub is audible.
Answer is L: Systemic Lupus Erythematosus

5. Rheumatological conditions

- | | |
|------------------------------|---------------------------------|
| A. Ankylosing spondylitis | G. Reiter's syndrome |
| B. Antiphospholipid syndrome | H. Rheumatoid arthritis |
| C. CREST syndrome | I. Scleroderma |
| D. Giant cell arteritis | J. Sjogren's syndrome |
| E. Polyarteritis nodosa | K. Systemic lupus erythematosus |
| F. Polymyositis | |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 38-year-old man presents with progressive breathlessness, unproductive cough and difficulty in swallowing. He also noted that his hands become painful and pale in cold weather. Chest radiographs showed patchy shadows in both mid-zones and bases. ☐
2. A 31-year-old travel agent presents with painful knees, red eyes and dysuria. He has just returned from a trip to Spain. ☐
3. A 78-year-old woman presents with headache, anorexia and fever which she has had for a few weeks. Erythrocyte sedimentation rate (ESR), C-reactive protein (CRP) and platelets were elevated, while hemoglobin was low. ☐
4. A 46-year-old woman complains of dryness of the mouth and eyes, joint pain and difficulty in swallowing. Schirmer's test and Rose Bengal staining are both positive. ☐
5. A 45-year-old woman presents with a 4-month history of multiple joint pain and progressive difficulty climbing stairs. Muscle biopsy was normal. EMG showed spontaneous fibrillation, high-frequency repetitive potentials and polyphasic potentials on voluntary contractions. ☐

Answers: I G D J F

6. Arthritis

- | | |
|------------------------------|---------------------------------|
| A. Antiphospholipid syndrome | G. Reiter's syndrome |
| B. Felty's syndrome | H. Rheumatoid arthritis |
| C. Giant cell arteritis | I. Scleroderma |
| D. Osteoarthritis | J. Sjogren's syndrome |
| E. Polyarteritis nodosa | K. Systemic lupus erythematosus |
| F. Pseudogout | |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 53-year-old woman complains of pain, swelling and stiffness in the distal interphalangeal joints of her hands, but has no other joint complaints. ☐
2. A 60-year-old previously fit man presents with a 2-month history of fatigue, weight loss of 5 kg, dyspnea on exertion, abdominal pain and progressive numbness in his feet. He had recently developed mild polyarthritis in his hands. On examination there was evidence of left median nerve mononeuritis and his blood pressure was 150/100 mmHg. Chest radiography showed cardiomegaly. ☐
3. A 77-year-old woman with long-standing rheumatoid arthritis presents with fever and dysuria. Her past history included recurrent chest and urinary infections. On examination she was hyperpigmented and emaciated. Her hands and feet were severely deformed. Abdominal examination revealed splenomegaly, but no hepatomegaly or lymphadenopathy. ☐
4. A 27-year-old man presents with low back pain, pain in the right knee and sore eyes. He had had an episode of diarrhoea 3 weeks earlier, and has a positive family history of back pain. Pelvic radiography showed sclerosis and erosion of the lower joint margins. ☐
5. A 22-year-old woman presents with a 3-week history of fever, pleuritic chest pain, stiffness and swelling in the wrists, MCP joints and PIP joints. On examination there is bilateral pretibial edema. ☐

Answers: D E B G K

7. Rheumatologic Conditions

- | | |
|------------------------------|---------------------------------|
| A. Antiphospholipid syndrome | G. Reiter's syndrome |
| B. Churg-Strauss syndrome | H. Rheumatoid arthritis |
| C. Dermatomyositis | I. Sjogren's syndrome |
| D. Giant cell arteritis | J. Systemic lupus erythematosus |
| E. Polymyalgia rheumatica | K. Systemic Sclerosis |
| F. Polymyositis | L. Takayasu's arteritis |

For each clinical scenario below, give the most likely cause for the clinical findings. **Each option may be used only once.**

1. A 52-year-old woman complains of a 4-month history of Raynaud's phenomenon, progressive skin tightness, thickening of the fingers and hands, dyspnea on exertion and dysphagia. ☐
2. A 52-year-old man complains of a gritty sensation in his eyes and dry mouth. He also complains of arthralgia in both hands and knees. On examination there are multiple purpuric lesions over both calves and ankles. ☐
3. A 32-year-old man presents with a rash on his penis, pain in the left heel and right-side stiffness in the lower back upon arising in the morning. Two weeks earlier, he had had an episode of diarrhoea. ☐
4. A 25-year-old woman presents with deep venous thrombosis in the right leg. Her past history includes three miscarriages. Her blood tests show mild thrombocytopenia and a positive serology test for syphilis. ☐
5. A 73-year-old man presents with persistent malaise, anorexia, pain in the shoulders and hips, and loss of 10 kg over the last 10 weeks. On examination there is mild painful limitation of hip and shoulder motion and muscle tenderness but no weakness. ☐

Answers: K I G A E

Short Heading Questions (SHQ)

- 1- Which of the following is not associated with active SLE:
 - A. High serum level of ANA
 - B. Low serum level of complement
 - C. High serum level of C-reactive protein
 - D. High serum level of anti-ds DNA
 - E. High ESR
- 2- Exacerbations of SLE is produced by:
 - A. Rifampicin
 - B. Oral contraceptives
 - C. Carbamazepine
 - D. Reserpine
 - E. Neomercazole
- 3- Rheumatoid factor in SLE is positive in:
 - A. 20% cases
 - B. 35% cases
 - C. 50% cases
 - D. 70% cases
 - E. 60% cases
- 4- ANF in SLE is positive in approximately:
 - A. 60% cases
 - B. 70% cases
 - C. 80% cases
 - D. 95% cases
 - E. 100% cases
- 5- Lupus nephritis is treated by all EXCEPT:
 - A. Interferon
 - B. Glucocorticoids
 - C. Azathioprine
 - D. Cyclophosphamide
 - E. Mycophenolate
- 6- Mixed connective tissue disease (MCTD) is a combination of SLE, scleroderma, rheumatoid arthritis and
 - A. Sjogren's syndrome
 - B. Polymyositis
 - C. Myasthenia gravis
 - D. Osteoarthritis
 - E. Eosinophilic fasciitis

7- Rose-Waaler test is positive in rheumatoid arthritis in:

- A. 30% cases
- B. 45% cases
- ☒ C. 70% cases
- D. 90% cases
- E. 60% cases

8- Rheumatoid nodules are characterized by all EXCEPT:

- A. Big
- ☒ B. Tender
- C. Fixed to skin
- D. Ulcerate
- E. Associated with positive rheumatoid factor

9- Still's disease does not give rise to:

- ☒ A. Positive Rose-Waaler test
- B. Splenomegaly
- C. Lymphadenopathy
- D. Maculopathy rash
- E. Fever

10- Which is not a disease-modifying antirheumatic drug?

- A. Hydroxychloroquine sulphate
- B. Azathioprine
- C. Sulphasalazine
- ☒ D. Naproxen
- E. Methotrexate

11- Felty's syndrome is not associated with:

- ☒ A. Age of onset 20-25 yrs ✓
- B. Vasculitis
- C. Lymphadenopathy
- D. Thrombocytopenia ✓
- E. Splenomegaly ✓

12- All are extra-articular manifestations of rheumatoid arthritis EXCEPT:

- A. Fibrosing alveolitis
- B. Pericarditis
- C. Mononeuritis multiplex
- ☒ D. Ulcerative colitis
- E. Sjögren's Syndrome

13- Drug-induced SLE is not commonly associated with:

- A. Polyarthritides
- B. Pulmonary infiltrates
- ☒ C. Renal involvement
- D. Polyserositis
- E. Skin rash

14- Which is not an extra-articular manifestation of ankylosing spondylitis?

- A. Acute pulmonary fibrosis
- B. Aortic incompetence
- C. Amyloidosis
- ☒ D. Raynaud's phenomenon
- E. Uveitis

15- The most effective prophylaxis adopted in gout by:

- ☒ A. Allopurinol
- B. Benzbromarone
- C. Probenecid
- D. Colchicine
- E. Diclofenac

16- Terminal interphalangeal joint is classically involved in:

- A. Rheumatoid arthritis
- B. Reactive arthritis
- C. Behcet's syndrome
- ☒ D. Psoriatic arthropathy
- E. Pseudogout

17- Behcet's syndrome is not associated with:

- A. Meningoencephalitis
- B. Genital ulceration
- C. Thrombophlebitis
- ☒ D. Urethritis
- E. Iridocyclitis

18- Heberden's node is seen in:

- ☒ A. Osteoarthritis
- B. Progressive systemic sclerosis
- C. Dermatomyositis
- D. Gout
- E. Polyarteritis

19- Multiple myeloma is associated with all of the following EXCEPT:

- A. Bone pain
- B. Hypercalcemia
- ☒ C. High alkaline phosphatase
- D. Bone marrow failure
- E. Anemia

20- Drug of choice for relieving pain in osteoarthritis is:

- A. Corticosteroids.
- B. Ibuprofen
- ☒ C. Paracetamol.
- D. Diclofenac
- E. Penicillamine

21- Hypertrophic osteoarthropathy is most commonly due to:

- A. Mesothelioma of pleura
- B. COPD
- ☒ C. Bronchogenic carcinoma
- D. Fibrosing alveolitis
- E. Tuberculosis

22- Example of autoimmune arthritis is:

- ☒ A. Rheumatoid arthritis
- B. Hemophilic arthritis
- C. Psoriatic arthritis
- D. Osteoarthritis
- E. Reiter's syndrome

23- Regarding drug-induced SLE which is false:

- ☒ A. Nephritis is rare
- B. Hydralazine and procainamide are most common causes
- C. Anti-Histone antibodies are present
- ☒ D. Central nervous system involvement is common
- E. Serositis is common

24- A 20-years woman has repeated attacks of myalgia, non-deforming arthralgia, pericarditis and pleural effusion for few years. The laboratory screening test should be

- A. Rose-Waaler agglutination test
- ☒ B. Antinuclear antibodies
- C. CD4 lymphocyte count
- D. ASO titre
- E. ANCA

25- In rheumatoid arthritis, rheumatoid factor is formed against:

- ☒ A. IgG
- B. IgA
- C. IgM
- D. IgD
- E. IgE

26- Penicillamine and colchicine both are used in treatment of:

- A. Rheumatoid arthritis
- B. Systemic lupus erythematosus
- ☒ C. Progressive systemic sclerosis.
- D. Wilson's disease
- E. Gout

27- Hydroxychloroquine toxicity does not produce:

- A. Maculopathy
- B. Corneal deposits
- C. Optic atrophy
- ☒ D. Cataract
- E. Dermatitis

28- Recurrent anterior uveitis is most characteristic of:

- ☒ A. Behcet's syndrome
- B. Rheumatoid arthritis
- C. Systemic lupus
- D. Sjogren's syndrome erythematosus
- E. Temporal arteritis

29- Still's disease is classically associated with all EXCEPT:

- ☒ A. Sacroiliitis
- B. Maculo-papular rash
- C. Negative Rose-Waaler test ?
- D. Involvement of metacarpophalangeal joints
- E. Splenomegaly

30- Arthritis mutilans' is characteristic of:

- ☒ A. Psoriasis
- B. Reiter's syndrome
- C. Behcet's syndrome
- D. Sjogren's syndrome
- E. Rheumatoid arthritis

31- Brucella arthritis commonly affects:

- A. Knee joint
- B. Joints of hands
- ☒ C. Spine
- D. Metatarsophalangeal joint
- E. Hip joint

Rheumatology (SHQs)

32- Which of the following usually presents as mono arthropathy:

- A. SLE
- B. Rheumatoid arthritis
- C. Gout
- D. Sjogren's syndrome
- E. Osteoarthritis

Rheumatology (SHQs)

Answer key:

- 1- C
- 2- B
- 3- A
- 4- D
- 5- A
- 6- B
- 7- C
- 8- B
- 9- A
- 10- D
- 11- A
- 12- D
- 13- C
- 14- D
- 15- A
- 16- D
- 17- D
- 18- A
- 19- C
- 20- C
- 21- C
- 22- A
- 23- D
- 24- B
- 25- A
- 26- C
- 27- D
- 28- A
- 29- A
- 30- A
- 31- C
- 32- C

INFECTIONS

Multiple Choice Questions (MCQs)

1. A 40-year-old man is admitted for chemotherapy for treatment of acute myelogenous leukemia. A central line through his subclavian vein is inserted to facilitate infusion of chemotherapeutic agents. Ten days after this procedure, he develops a temperature of 39.4°C. Physical examination is remarkable for tachycardia and tenderness around the central line insertion site. Blood cultures and a chest x-ray film are negative. **Which of the following is the most appropriate next step in management?**

- A. Administer amphotericin
- B. Administer vancomycin
- C. Remove the central line
- D. Remove the central line and insert a new one
- E. Repeat blood cultures

The correct answer is C. Unfortunately, nosocomial infections are very common in hospitals. Given this patient's physical examination and history, it is most likely that the central line is the site of the current infection. Anything short of removal of the line will not remove the source of the infection, and it will be almost impossible to treat the infection. Waiting until the blood cultures grow the offending organism (**choice E**) would be risky since the patient's infection would remain untreated and get out of control. If the infecting pathogen is not known, broad coverage is preferred; therapy can be narrowed once the pathogen, and its sensitivity to antibiotics, is known.

2. A 26-year-old man comes to the physician because of sore throat, fever, and malaise for 1 week and a diffuse skin rash for 1 day. The skin rash developed after the patient took ampicillin. Examination reveals pharyngitis and tonsillitis, cervical lymphadenopathy, and splenomegaly. Laboratory studies showed:

Hematocrit 40%
 Leukocyte count 4800/mm³
 Segmented neutrophils 45%
 Lymphocytes 40%
 Platelet count 76,000/mm³
 Alanine aminotransferase 80 U/L
 Aspartate aminotransferase 70 U/L
 Bilirubin, total 1.2 mg/dL

Peripheral blood smear showed numerous atypical large lymphocytes with vacuolated cytoplasm. A heterophil antibody test is positive. **Which of the following is the most likely diagnosis?**

- A. Acute cytomegalovirus (CMV) disease
- B. Acute lymphocytic leukemia
- C. Drug-induced thrombocytopenia
- D. Infectious mononucleosis
- E. Streptococcal pharyngitis with Leukemoid reaction

The correct answer is D. Characteristics of infectious mononucleosis include signs and

symptoms similar to influenza, with lymphadenopathy (especially in the cervical chain) and splenomegaly. Skin rash is infrequent, but ampicillin administration is followed by a diffuse maculopapular rash in 90% of cases. Atypical lymphocytes are easily identified on blood smears. Granulocytopenia is present initially, and thrombocytopenia develops frequently. IgM antibodies to Epstein-Barr virus appear during the acute phase. The Monospot test is based on heterophil (sheep cell agglutination) antibody tests and becomes positive before the 4th week after the onset of the disease.

Acute cytomegalovirus (CMV) disease (**choice A**) may be indistinguishable in its clinical and laboratory manifestations from infectious mononucleosis, but the heterophil antibody test is negative in CMV infection. Most CMV infections, however, remain asymptomatic in immunocompetent hosts, producing severe disseminated infections in immunocompromised patients.

3. A 35-year-old man complains of recurrent bouts of high fever with shaking chills for 1 week. He was on a work trip in Sudan 1 month ago. Each attack begins with shaking chills lasting a few hours, followed by fever up to 41.0°C, which resolves with profuse sweating. These attacks have occurred every other day. The patient feels slightly tired between episodes of fever but otherwise is well. Examination reveals mild splenomegaly. The liver is not palpable. A blood smear at this time is negative for parasites. **Which of the following is the most appropriate next step in diagnosis?**

- A. Blood cultures
- B. Repeat blood smear during an attack
- C. Repeat blood smear every 8 hours for 3 days
- D. Repeat blood smear once more
- E. Start treatment with chloroquine

The correct answer is C. The recent travel history to a malaria-endemic region, and especially the sequential occurrence of typical febrile attacks every other day, should alert the physician to the possibility of *Plasmodium* infection. This parasite should be looked for in peripheral blood smears. Thick blood films are used for detection, whereas thin blood films are used for identification of the *Plasmodium* species. The number of parasites varies considerably during the course of the disease, and *Plasmodium falciparum* (the most dangerous species) is particularly difficult to detect. Thus, to establish the diagnosis, blood smears should be examined every 8 hours during and between febrile attacks for at least 3 days.

4. A 68-year-old woman presented with a two day history of pain and swelling of the right ankle. She could not recall any history of recent trauma. On examination she was febrile, temperature 38.1°C. The right ankle was swollen and very tender with a reduced range of movement. **Which of the following investigations would be of most help in establishing the diagnosis?**

- A. Aspiration of the right ankle
- B. Blood cultures
- C. Erythrocyte sedimentation rate
- D. Serum urate level
- E. X-ray of the right ankle

Infections (MCQs)

The correct answer is A. Septic arthritis is a medical emergency and this is the most likely diagnosis in this case. It is essential that the joint is aspirated in order to establish a microbiological diagnosis that will guide appropriate treatment. All of the other investigations listed would be of value in managing this patient, but in this setting joint aspiration is critical.

5. A 19-year-old student presents with a fifteen week history of diarrhea. He has lost 2 kg in weight, and has no recent travel abroad. A smear of a duodenal biopsy reveals many trophozoites. **What is the best treatment option?**

- A. Ciprofloxacin
- B. Gluten free diet
- C. Metronidazole
- D. Prednisolone
- E. Quinine

The correct answer is C. The diagnosis here is Giardiasis, caused by *Giardia lamblia*. *Giardia* has been reported as a cause of chronic diarrhoea. Most patients respond to oral metronidazole 250-400mg t.d.s. for 5 days.

6. A 65-year-old woman presents with fever 38.5°C for 2 weeks. On examination; Bp 140/60 mmHg, pulse 110/min, RR 20/min, and there is a grade 3 systolic murmur heard over cardiac apex echocardiography confirmed the presence of vegetations on mitral valve leaflets. Appropriate antibiotic therapy started. **Which of the following is the most useful in order to monitor her response to antibiotics?**

- A. Serial blood cultures
- B. Serial full blood count, monitoring the white cell count
- C. Serial transthoracic echocardiography
- D. Serum bactericidal activity
- E. Serum C-reactive protein concentration

The correct answer is E. CRP is a member of the extraxins protein family and levels are greatly elevated during acute inflammation. CRP augments the immune response to certain antigens, activates complement, and increases the monocytic production of certain tissue factors. CRP binds to bacterial surfaces, acting as an opsonin. CRP concentrations are elevated in almost all inflammatory, infectious, and malignant diseases. Serial measurements of CRP concentrations provide a simple, effective, non-invasive means of measuring response to antibiotic therapy.

Infections (MCQs)

7. A 51-year-old lady presented to hospital with a two-day history of malaise and headache. On the day of admission the headache had become more intense and was associated with pain in her neck. Her husband reported that she had also been febrile and confused at times. She had previously been well and had no significant past medical history. On examination, she was febrile 38.1°C, looked unwell and was photophobic. Kernig's and Brudzinski's signs were positive. The fundi were normal. Following a normal CT scan a lumbar puncture was performed and CSF analysis showed:

White cells	200/mm ³
Red cells	2/mm ³
CSF protein	0.9 g/L (0.15 – 0.45)
CSF glucose	1.6 mmol/L (3.3-4.4)
Plasma glucose	5.3 mmol/L (3.0 – 6.0)

What is the most likely, causative organism?

- A. *Escherichia coli*
- B. *Listeria monocytogenes*
- C. *Mycobacterium tuberculosis*
- D. *Streptococcus pneumoniae*
- E. *Streptococcus pyogenes*

The correct answer is D. The most common causes of bacterial meningitis in persons over 50 years of age are:

1. *Streptococcus pneumoniae*
2. *Neisseria meningitidis*
3. *Listeria monocytogenes*
4. "Gram-negative bacilli"

Physical examination may provide clues to the aetiology of meningitis in affected patients:

- (i) Morbilliform rash with pharyngitis and lymphadenopathy may suggest a viral etiology (EBV, CMV, adenovirus, HIV).
- (ii) Macules and petechiae that rapidly evolve into purpura suggest meningococemia (with or without meningitis).
- (iii) Vesicular lesions in a dermatomal distribution suggest varicella zoster virus.
- (iv) Genital vesicles suggest HSV-2 meningitis.
- (v) Sinusitis or otitis suggests direct extension into the meninges, usually with *Streptococcus pneumoniae* and *Haemophilus influenzae*.
- (vi) Rhinorrhea or otorrhea suggest a CSF leak from a basilar skull fracture, with meningitis most commonly caused by *Streptococcus pneumoniae*.
- (vii) Hepatosplenomegaly and lymphadenopathy suggest a systemic disease, including viral (e.g. mononucleosis like syndrome in EBV, CMV, and HIV) and fungal (e.g. disseminated histoplasmosis) disease.
- (viii) The presence of a murmur suggests infective endocarditis with secondary bacterial seeding of the meninges.
- (ix) Evidence of parotitis is observed in some cases of mumps meningitis. Kernig's sign in a supine patient, flex the hip to 90° while the knee is flexed at 90°.

An attempt to further extend the knee produces pain in the hamstrings and resistance to further extension.

Brudzinski sign: Passively flex the neck while the patient is in a supine position with extremities extended. This maneuver produces flexion of the hips and knees in patients with meningeal irritation.

8. A 40-year-old farmer presented with a 24-hour history of fever and increasing confusion. On examination he was febrile 39.5°C. A generalized erythematous rash, covering most of his body, was observed. He also had a paronychia infection of his right index finger, with lymphangitis extending caudally and with axillary lymphadenopathy. His heart rate was measured at 120 beats per minute with a blood pressure of 80/60 mmHg. What is the most likely diagnosis?

- A. Hantavirus infection
- B. Leptospirosis
- C. Orf
- D. Staphylococcal toxic shock syndrome
- E. Stevens-Johnson syndrome

The correct answer is D. The history is typical of Staphylococcal toxic shock syndrome (TSS) shock, fever, confusion on and rash. The primary source of infection in this case is the Paronychia of his right index finger. Hantavirus infections (viral zoonoses transmitted via rodents) typically have two distinct presentations: either as a hemorrhagic fever with renal failure or as an acute pulmonary syndrome. The former manifestation is commonest in the Far East and eastern Europe, while the latter is the predominant form in the south western United States and South America. Leptospirosis does not typically cause a rash and is often associated with jaundice; leptospirosis would not explain the lesion on his finger. Orf, a zoonotic infection caused by a pox virus, presents with painless ulcerated lesions on the hands of farmers, but does not fully explain this clinical picture. Stevens-Johnson syndrome typically starts with an erythema multiforme-type rash that spreads widely and involves the buccal mucosa and conjunctivae; often caused by antibiotic therapy, but does not fit the clinical picture presented here.

13. A 45-year-old man presented with hemoptysis, weight loss, night fever, and night sweats. He has been diagnosed with pulmonary tuberculosis. Which of the following investigations is essential prior to starting therapy?

- A. Full blood count
- B. Liver function test
- C. Plasma glucose
- D. Urine for acid-fast bacilli
- E. Vitamin B6

The correct answer is B. Hepatotoxicity is a feature of antituberculous treatment. "Liver function should be checked before treatment for clinical cases.

14. A 28-year-old man had been treated for pulmonary tuberculosis with rifampicin, isoniazid, pyrazinamide and ethambutol for four weeks. Pre-treatment liver function tests were normal but his most recent investigations revealed:

Serum total bilirubin	6mg/dl
Serum alanine amino transferase	620u/l (5-45)
Serum aspartate amino transferase	450 u/l (5-45)
Serum alkaline phosphatase	720 u/l (40-110)

Which one of the following is the most appropriate next step?

- A. Stop all treatment
- B. Stop ethambutol
- C. Stop isoniazid
- D. Stop pyrazinamide
- E. Stop rifampicin

The correct answer is A. All tuberculosis patients should have pretreatment LFT, should be supervised by a chest physician and should be informed of possible side effects of treatment. If there is no preexisting liver disease, LFTs are only repeated (and treatment stopped) if fever, malaise, vomiting, jaundice or unexplained deterioration occurs during treatment. Regular LFT should be performed in patients with previously known chronic liver disease. If AST/ALT levels rise by 5 times normal/ bilirubin level rises, then rifampicin/isoniazid/pyrazinamide should be stopped. If the patient is not unwell and/or has non-infectious TB, no treatment until LFT returns to normal. If clinically unwell or sputum smear positive within 2 weeks of starting treatment, consider streptomycin and ethambutol until LFT returns to normal. Once LFT are back to normal, challenge dosages can be re introduced sequentially in order of isoniazid, rifampicin and pyrazinamide with daily monitoring of patient's condition and LFT. If further reaction occurred, offending drug is excluded and a suitable alternative regimen used.

15. A young girl presents with a protracted history of watery diarrhoea. Giardiasis is suspected but 3 stool samples are negative. What is the best investigation to confirm your diagnosis?

- A. Abdominal U.S
- B. Rectal biopsy
- C. Serum IgM Giardia antibodies
- D. Small intestine biopsy
- E. Stool microscopy

The correct answer is D. Giardia may be difficult to diagnose from stool samples alone. Concentration techniques and optimizing sample preparation may improve stool sample yield. However, parasitic antigen detection in stool is at least as sensitive and specific as good microscopic examination of stool, and may be easier to perform. In this case detection of Giardia may be achieved by sampling of duodenal fluid, or small bowel biopsy.

Infections (MCQs)

16. A patient presents with a 36 hour history of severe pain and vesicular rash in the T4 dermatome. What is the most appropriate management?

A. Acyclovir
B. Carbamazepine
C. Famciclovir
D. Nothing
E. Prednisolone

The correct answer is A. Carbamazepine is a useful management option in the treatment of post-herpetic neuralgia. Early use of steroids in herpes zoster may also reduce the amount of analgesia required and the length of illness. Acyclovir and Famciclovir may be used to treat herpes zoster. They both reduce time to healing and resolution of associated pain. Acyclovir is now a generic medication and therefore will be cheaper than famciclovir and is the most cost effective of the treatments listed

17. A 35-year-old woman presents with fever, rigors, malaise and weight loss. She had undergone prosthetic valve replacement 1 month before. C3 level was reduced and echocardiography showed small vegetations. Which microorganism is most likely to be responsible for this?

A. Candida
B. Coxiella burnetii
C. Staphylococcus aureus
D. Staphylococcus epidermidis
E. Streptococcus viridans

The correct answer is D. Prosthetic valve endocarditis arising within 2 months of valve surgery is generally the result of intra operative contamination of the prosthesis or a bacteraemia postoperative complication. The nosocomial nature of these infections is reflected in their primary microbial causes: coagulase-negative staphylococci (Staphylococcus epidermidis), S. Aureus, facultative gram-negative bacilli, diphtheroids, and fungi. The oral cavity, skin, and upper respiratory tract are the respective primary portals for the viridans streptococci, staphylococci, and HACEK organisms (Haemophilus, Actinobacillus, Cardiobacterium, Eikenella, and Kingella) causing community-acquired native valve endocarditis. Streptococcus bovis originates from the gastrointestinal tract, where it is associated with polyps and colonic tumors, and enterococci enter the bloodstream from the genitourinary tract.

Infections (MCQs)

18. An 18-year old student presented with profuse watery diarrhea. Initially he did not have any nausea, vomiting or stomach cramps, but these developed within a day. He described the diarrhea as looking like cloudy watery but without any blood or mucus. He was opening his bowels over 20 times per day. On examination he looked pale; he was afebrile. Skin turgor was reduced and mucous membranes were dry. Stool culture revealed a growth of Vibrio cholerae. Which is the most appropriate antibiotic to administer?

A. Ceftriaxone
B. Doxycycline
C. Meropenem
D. Metronidazole
E. Piperacillin plus gentamicin

The correct answer is B. Cholera has a short incubation period of 24-48 hours. The illness begins with the sudden onset of painless, watery diarrhoea. The diarrhea may be accompanied later by abdominal cramps, nausea and vomiting. Patients are usually afebrile. The diarrhoea is typically described as having the appearance of rice water and a faintly fishy smell. The diarrhoea may be copious and result in hypovolemic shock unless fluids are administered.

The primary aim of treatment is to restore fluid balance; antibiotics have a secondary role. However, antibiotics have been shown to reduce fluid loss and hasten clearance of the organism from the gut.

Appropriate antibiotics include tetracycline, doxycycline, ciprofloxacin, erythromycin, and co-trimoxazole. Tetracycline is usually the first-line drug of choice, although resistance is emerging in certain parts of the world.

19. A 25 -year-old woman presented with a history of confusion and fever that had worsened gradually over the preceding four days. On examination she was drowsy and had mild neck stiffness. Neurological examination revealed an extensor left plantar response. A CT scan of her brain showed an area of low attenuation in the right temporo-parietal region. What is the most likely diagnosis?

A. Cerebral toxoplasmosis
B. Herpes simplex encephalitis
C. Listeria meningoenkephalitis
D. Pneumococcal meningitis
E. Pyogenic brain abscess

The correct answer is B. Herpes simplex encephalitis (HSE) often presents sub-acutely over several days with declining cerebral function. The temporal or temporo-parietal regions are affected earlier and neuro-imaging usually demonstrates this. However, temporal lobe involvement is not pathognomonic of HSE. Cerebral toxoplasmosis is the result of reactivation of toxoplasmosis in severely immunocompromised individuals. Listeriosis is associated with the consumption of soft cheese. Streptococcus pneumoniae causes acute pyogenic meningitis and is often associated with suppurative otitis media or sinusitis. Brain abscesses are usually readily demonstrable by cranial CT scans.

Infections (MCQs)

20. A 21-year-old man with non-Hodgkins lymphoma and hemolytic anaemia is assessed for splenectomy; Pneumovax Vaccine was considered. When should vaccine be administered?

- A. One month after surgery
- B. One month before surgery
- C. One week after surgery
- D. One week before surgery
- E. Perioperatively

The correct answer is B. The vaccine should be given a minimum of two weeks before elective splenectomy in order to ensure an optimal antibody response. In emergency splenectomy the patient should be immunized as soon as possible after recovery from the operation and before discharge from hospital. Unvaccinated splenectomized patients some time earlier should be vaccinated at the first opportunity. Vaccination is delayed for at least six months after immunosuppressive chemotherapy or radiotherapy, during which time prophylactic antibiotics should be given.

21. A 60-year-old man was admitted with community-acquired pneumonia and deteriorated over the next few hours. Which one of the following indicates a poor prognosis?

- A. A total white cell count of $17 \times 10^3/L$
- B. Blood pressure of 110/70 mm Hg
- C. Respiratory rate of 35 breaths/min
- D. Rigors
- E. Temperature of $39^\circ C$

The correct answer is C. The presence of raised urea ($>7\text{mmol/l}$), hypotension (diastolic BP equal or $<60\text{mmHg}$) and respiratory rate equal or $>30/\text{min}$ is associated with significantly increased risk of death. Other less important features of severe pneumonia include older age (>60), comorbidity, confusion, cyanosis, WBC <4000 or >30000 , hypoxia and CXR with multi lobe involvement.

22. A 38-year-old woman is referred with bilateral weakness in her legs. She also complains of general malaise. On examination she appeared unwell and was pyrexial $38.9^\circ C$. She has large palpable cervical lymph nodes bilaterally. Her pharynx was inflamed with areas of exudate on the pharyngeal wall. Neurological examination revealed global weakness of both legs and absent reflexes. What is the most likely diagnosis?

- A. Cytomegalovirus infection
- B. Diphtheria
- C. Epstein-Barr virus infection
- D. Hodgkin's disease
- E. Streptococcal tonsillitis

The correct answer is B. Pharyngeal diphtheria presents with fever, sore throat, cervical lymphadenopathy and an adherent, grayish pharyngeal membrane. The diphtheria toxin causes cardio- and neurotoxicity. Treatment consists of antibiotic

Infections (MCQs)

therapy and diphtheria antitoxin.

23. An 82-year-old lady is admitted from her nursing home with headache, photophobia and neck stiffness. Her temperature is $39.0^\circ C$, pulse rate 115 beats/min. There is no skin rash or focal neurological signs and her Glasgow coma scale is 15/15. CT scan shows no contraindication to lumbar puncture. CSF is obtained and Gram stain shows Gram negative coccus-bacilli, subsequent culture confirms Haemophilus influenzae meningitis. What chemoprophylaxis should be offered to her contacts?

- A. Azithromycin
- B. Ceftriaxone
- C. Ciprofloxacin
- D. No chemoprophylaxis required
- E. Rifampicin

The correct answer is E: Close contacts of Haemophilus influenzae meningitis should receive rifampicin; children under 2 years should be vaccinated.

24. A 35-year-old man, presented with cellulitis of his right leg. On examination he was mildly confused and febrile $40.1^\circ C$ with a pulse was 120 / minute and BP 80/55 mmHg. He was treated with intravenous benzylpenicillin and flucloxacillin. Group A Streptococcus was isolated from two sets of blood cultures. There was no significant clinical improvement after 24 hours. What antibiotic should be added?

- A. Ciprofloxacin
- B. Clindamycin
- C. Gentamicin
- D. Rifampicin
- E. Vancomycin

The correct answer is B. The patient has a severe cellulitis with features of Streptococcal toxic shock syndrome (TSS). Streptococcal TSS is mediated via Streptococcal exotoxins. Although clindamycin is a bacteriostatic antibiotic, it acts by switching-off protein synthesis within bacteria; this in turn will lead to decreased exotoxin expression, thereby removing the mediators of TSS.

25. A 28-year-old man who had had tuberculosis and mediastinal lymph nodes diagnosed two weeks previously and who had been started on chemotherapy with rifampicin, isoniazid and pyrazinamide was admitted because of the increasing dyspnea and stridor. Chest X-ray showed compression of both main bronchi by carinal lymph node enlargement. What is the next step in management?

- A. Mediastinoscopy and biopsy
- B. Refer for stent insertion/tracheostomy
- C. Refer for urgent CT scan of the mediastinum
- D. Start prednisolone
- E. The addition of ethambutol

The correct answer is D. The treatment of TB mediastinal lymphadenitis is the same as pulmonary TB. The nodes may enlarge during or after treatment as a result of

Infections (MCQs)

Infections (MCQs)

hypersensitivity. Corticosteroid is effective in reducing the enlargement and hence will help the stridor and breathlessness.

26. A 15 year-old girl presented with a 12-hour history of fever and global headache. On examination she was febrile 37.5°C. She was fully conscious. Mild neck stiffness was noted but there were no other neurological signs. Cerebrospinal fluid analysis showed:
- | | |
|------------|--------------------------|
| Cell count | 200/mL (60% lymphocytes) |
| Protein | 0.8 g/L (0.15-0.45) |
| Glucose | 60 mg/dl |
| Gram stain | No organisms seen |

What is the most likely diagnosis?

- A. Bacterial meningitis
- B. Cryptococcal meningitis
- C. Lymphomatous meningitis
- D. Tuberculous meningitis
- E. Viral meningitis

The correct answer is E. Enteroviruses and mumps are the commonest causes of viral meningitis. CSF changes with bacterial meningitis typically include high protein, low glucose and neutrophil pleocytosis. Cryptococcal meningitis is an infection of severely immunocompromised individuals, especially advanced HIV infection. Tuberculous meningitis is an insidious illness, presenting over weeks and months.

27. A 15-year-old female is a close contact of a student who has developed meningitis. The last contact she had with her friend was two days ago when her friend developed headache. She has not received any previous vaccination for meningitis. What is the most appropriate action for her?

- A. No treatment is required and the girl can be reassured
- B. She should receive meningococcal immunoglobulin only
- C. She should receive the meningococcal A and C vaccination only
- D. She should receive the meningococcal A and C vaccination plus rifampicin
- E. Treat with rifampicin only

The correct answer is D. This girl runs a reasonably high risk of developing meningitis and should receive Meningitis A and C vaccination together with rifampicin. Antibiotics used for chemoprophylaxis are rifampicin, minocycline, spiramycin, ciprofloxacin and ceftriaxone.

28. A 52-year-old man presented to the ER with a two day history of increasing breathlessness, productive cough and fever. He was previously fit and well with no past history of note. He was not a cigarette smoker. On examination he was febrile, temperature was 38.5°C, pulse rate 100/minute and regular, blood pressure 120/80 mmHg and respiratory rate of 25 breaths/minute. Investigations showed:

Hb	15.0 g/dL
WBC	18.5 x10 ⁹ /L
Platelets	350 x 10 ⁹ /L
Serum sodium	137 mEq/L
Serum potassium	4.5 mEq/L
Serum urea	40 mg/dl
Serum creatinine	1.4 mg/dl
PaO ₂ (arterial blood, on air)	9.0 kPa (11.3-12.6)

Chest x-ray showed right middle lobe consolidation.

What is the most appropriate antibiotic?

- A. Amoxicillin
- B. Amoxicillin plus Erythromycin
- C. Ceftriaxone
- D. Ciprofloxacin
- E. Co-Amoxi-Clav

The correct answer is A. The guidelines state that amoxicillin should be first line therapy for all pneumoniae, with the addition of flucloxacillin if there is risk of it being Staphylococcal. Gentamicin may be indicated in severe hospital acquired pneumonia, and rifampicin in severe atypical infections (e.g. Legionella).

29. A 45-year-old man presented with a three day history of headache and increasing confusion. On examination he was febrile with marked neck stiffness. Cerebrospinal fluid analysis revealed White cell count 600/ml, White cell differential > 90% Neutrophils, Gram stain Gram-negative diplococci. Which one of the following antibiotics is the most appropriate treatment?

- A. Ampicillin
- B. Benzylpenicillin
- C. Cefuroxime
- D. Ciprofloxacin
- E. Gentamicin

The correct answer is B. This is clearly a case of meningococcal meningitis. The commonest causes of bacterial meningitis in adults are:

- Neisseria meningitidis (Gram negative diplococci)
- Streptococcus pneumoniae (Gram positive diplococci)

Treatments of bacterial meningitis on the basis of Gram stain results:

- Gram stain unavailable or no stainable organisms: Cefotaxime ± ampicillin.
- Gram-positive cocci: Cefotaxime + vancomycin
- Gram-positive bacilli: Ampicillin + gentamicin

Infections (MCQs)

- Gram-negative cocci: Benzyl penicillin (Penicillin G)
- Gram-negative bacilli: Cefotaxime + gentamicin

On the basis of CSF culture:

- Streptococcus pneumoniae - If penicillin MIC < 0.06 micrograms/mL: Benzyl penicillin (Penicillin G) or Cefotaxime - If penicillin MIC > 0.1 micrograms/mL (i.e. penicillin-resistant Pneumococcus): Cefotaxime + vancomycin if susceptibility to broad-spectrum cephalosporins reduced)
- Neisseria meningitidis: Benzyl penicillin (Penicillin G) Haemophilus influenza: Cefotaxime
- Listeria monocytogenes: Ampicillin + gentamicin
- Group B streptococcus: Benzyl penicillin (Penicillin G)

30. A 22-year-old lady was admitted with a 3 day history of fever, generalized lymphadenopathy and a macular rash over the trunk and legs. Which of the following is the most likely diagnosis?

- A. Actinomycosis
- B. Familial Mediterranean Fever
- C. Infectious Mononucleosis
- D. Sarcoidosis
- E. Tuberculosis

The correct answer is C. Infectious Mononucleosis occurs most commonly in adolescents and young adults. Clinical features occur after a 2-5 week incubation period and include fever, malaise, pharyngitis, and lymphadenopathy. Rash occurs more commonly in patients that have received penicillin or ampicillin.

Infections (EMQs)

Extended Matching Questions (EMQs)

1. Infections

- | | |
|----------------------------|-------------------------------|
| A. Campylobacter jejuni | G. Mycobacterium tuberculosis |
| B. Clostridium difficile | H. Neisseria meningitidis |
| C. Clostridium perfringens | I. Pneumocystis jirovecii |
| D. Coxiella burnetii | J. Salmonella |
| E. Escherichia coli | K. Staphylococcus aureus |
| F. Legionella pneumophila | L. Treponema Pallidum |

Choose the most likely infecting organism from the options above. **Each option may be used only once.**

- A 19-year-old girl presents with fever, photophobia and neck stiffness.
- A 40-year-old patient presents with bloody diarrhoea after treatment with broad-spectrum antibiotics.
- A young man presents with progressive ascending weakness and areflexia in all four limbs a few weeks after a gastrointestinal infection.
- A 33-year-old IV drug abuser presents with fever, rigors and night sweats. On examination he has a pansystolic murmur best heard at the lower sternal edge.
- A 65-year-old woman presents with frequency and dysuria.

Answers: H B A K E

1. A 19-year-old girl presents with fever, photophobia and neck stiffness.

Answer is H: These symptoms and signs are suggestive of meningitis, most likely to be meningococcal/pneumococcal infection. This is a medical emergency and antibiotic therapy must be commenced immediately and without delay. Cerebrospinal fluid (CSF) analysis of typical bacterial meningitis shows a very high neutrophil count, glucose less than half of the plasma value and increased protein.

2. A 40-year-old patient presents with bloody diarrhoea after treatment with broad-spectrum antibiotics.

Answer is B: This is a presentation of pseudomembranous colitis (PMC) and is caused by overgrowth of *Clostridium difficile*. The symptoms result from the toxins produced by the organism. Sigmoidoscopy usually reveals the characteristic erythematous and ulcerated mucosa covered by pseudomembranes, but in a proportion of patients the site of disease is more proximal and would therefore not be detected. Diagnosis is confirmed by detection of the toxin in the stool.

3. A young man presents with progressive ascending weakness and areflexia in all four limbs a few weeks after a gastrointestinal infection.

Answer is A: This is presentation of Guillain-Barré syndrome. There is a recognized association between a preceding gastrointestinal infection and the development of this condition. Around 70–85 per cent of patients make a complete/almost complete recovery. The most important complication of Guillain-Barré syndrome is the involvement of respiratory muscles. Arterial blood gases and bedside spirometry (forced vital capacity) should be monitored daily to detect significant compromise early.

High-dose intravenous immunoglobulin can reduce the severity and duration of illness in some patients.

4. A 33-year-old IVDU presents with fever, rigors and night sweats. On examination he has a pansystolic murmur best heard at the lower sternal edge.

Answer is K: This is the presentation of infective endocarditis. The signs suggest that there is tricuspid valve involvement. Right-sided endocarditis occurs more commonly in intravenous drug users where *Staphylococcus aureus* is the most common infecting organism. In others, a large variety of organisms may cause bacterial endocarditis including hemolytic streptococci and more rarely the HACEK group (*Haemophilus*, *Actinobacillus*, *Cardiobacterium*, *Eikenella*, and *Kingella*).

5. A 65-year-old woman presents with frequency and dysuria.

Answer is E: *E. coli* is the most common cause of urinary tract infection. *Proteus mirabilis* and *Klebsiella* sp. are other common pathogens.

2. Infections

- | | |
|-----------------------------------|--|
| A. <i>Brucella</i> | G. <i>Leptospira icterohaemorrhagiae</i> |
| B. <i>Chlamydia trachomatis</i> | H. <i>Mycobacterium</i> |
| C. <i>Clostridium perfringens</i> | I. <i>Proteus mirabilis</i> |
| D. <i>Coxiella burnetii</i> | J. <i>Pseudomonas aeruginosa</i> |
| E. group A streptococci | K. <i>Rickettsia akari</i> |
| F. herpes zoster | L. <i>Salmonella</i> |

Choose the most likely infecting organism from the options above. **Each option may be used only once.**

1. An 18-year-old young man with sickle-cell disease presents with osteomyelitis.

☐

2. A 23-year-old man presents with fever, night sweats, weight loss and hemoptysis.

☐

3. A 45-year-old man rescued from an accident presents with an open fracture of the tibia. He is in severe pain and the lower left limb is cold and pulseless. The muscles of the distal limb are brownish-black in colour.

☐

4. A 41-year-old sewer worker presents with fever, jaundice and reddened conjunctivae.

☐

5. A 12-year-old boy presents a few days after a sore throat with a punctate, erythematous generalized rash that spares his face. He has a 'strawberry tongue'.

☐

Answers: L H C G E

1. An 18-year-old young man with sickle-cell disease presents with osteomyelitis.

Answer is L: Staphylococcus aureus infection is by far the most common infecting organism in acute osteomyelitis. It is important to remember that Salmonella sp. infection is a well-recognized cause of osteomyelitis in a patient with sickle-cell disease.

2. A 23-year-old Somali man presents with fever, night sweats, weight loss and hemoptysis.

Answer is H: This is presentation of pulmonary tuberculosis. Treatment is started empirically if acid-fast bacilli (AFBs) are seen on Ziehl-Neelsen staining. Culture results (which take much longer) can be used to modify therapy if any bacterial resistance to medication is detected.

3. A 45-year-old man rescued from a mountaineering accident presents with an open fracture of the tibia. He is in severe pain and the lower left limb is cold and pulseless. The muscles of the distal limb are brownish-black in colour.

Answer is C: This is a presentation of gas gangrene. Clostridium perfringens, which thrives in the relative anaerobic conditions of necrotic tissue, is the most common infecting organism. Gas gangrene may be rapidly lethal as a result of the fact that the toxins may have both local and systemic effects, e.g. toxin has local lytic effects on erythrocytes, inflammatory and muscle cells, but can also contribute to hypotension. Severe pain is always a prominent feature. There are characteristic changes in the colour of the overlying skin to a blue-black colour and the appearance of blebs that discharge watery fluid and later blood. The classically described crepitus of gas gangrene is a late feature and often masked by the coexistent edemas. Gas gangrene is a medical and surgical emergency requiring surgical débridement (amputation is sometimes indicated) and appropriate antibiotic therapy to cover both aerobic and anaerobic organisms.

4. A 41-year-old sewer worker presents with fever, jaundice and reddened conjunctivae.

Answer is G: This is a presentation of leptospirosis which is a Zoonosis caused by infection with the Gram-negative bacterium Leptospira interrogans. Although commonly referred to as Weil's disease, the latter term was actually used to describe the clinical presentation of jaundice, renal failure and hemorrhage (pulmonary hemorrhage in the original description). This is a severe presentation carrying a 10 per cent mortality rate. In reality there is a wide variation in severity and many cases are probably not diagnosed. There are two phases of infection: an initial acute phase and a secondary immune phase. The first phase of infection is characterized by symptoms associated with proliferation and invasion of the leptospiras (e.g. fever, headache, reddened conjunctivae). The second phase is characterized by rising antibody titres, with aseptic meningitis being a common finding. It is during this immune phase that jaundice, hepatomegaly and renal failure may develop, resulting in Weil's disease. Leptospiras are sensitive to penicillin treatment.

5. A 12-year-old boy presents a few days after a sore throat with a punctate, erythematous generalized rash that spares his face. He has a 'strawberry tongue'.

Answer is E: This is presentation of scarlet fever caused by the erythrogenic toxin of group A streptococcal infection. This condition usually occurs in young children because by the age of 12 years most individuals have developed antibody against the exotoxin. The tonsils and pharynx are the usually the primary foci of group A streptococcal infection. Release of erythrogenic toxin causes the development of the generalized erythematous macular rash. The punctate lesions are typically accentuated in the skin folds, e.g. axillae, inguinal regions.

3. Infections

- | | |
|-----------------------------|--------------------|
| A. Cholera | I. Malaria |
| B. CMV (cytomegalovirus) | J. Polio |
| C. Enteric fever | K. Rabies |
| D. Giardiasis | L. Syphilis |
| E. Glandular fever | M. Tetanus |
| F. Herpes zoster (shingles) | N. Toxoplasmosis |
| G. HIV | O. Tuberculosis |
| H. Influenza | P. Viral hepatitis |

Choose the most likely infecting organism from the options above. **Each option may be used only once.**

1. A 30 year old man became unwell 4 weeks after a holiday in Africa. He developed headaches, muscle pains, feeling cold, severe rigors, high fever, flushing, vomiting & profuse sweating. ☐
2. A 50 year old man became unwell. He developed a fever, tiredness, night sweats & a productive cough. He lost 3 Kg in weight in 6 weeks. ☐
3. A 20 year old student with a sore throat, fever, anorexia, malaise & lymphadenopathy. She was treated for tonsillitis by her GP but did not complete the course because she developed an allergic rash. ☐
4. A 60 year old diabetic man with fever, malaise, headache & muscle pains. After a few days he started vomiting, became very ill & was confined to his bed. ☐
5. A 20 year old lady presented with anorexia, fever & joint pains. Jaundice appeared a week later & on examination her liver & spleen were both palpably enlarged & very tender. ☐

Answers: I O E H P

Infections (EMQs)

Infections (EMQs)

4. Infections

5. Infections

- A. Cholera
- B. CMV (cytomegalovirus)
- C. Enteric fever
- D. Giardiasis
- E. Glandular fever
- F. Herpes zoster (shingles)
- G. HIV
- H. Influenza

- I. Malaria
- J. Polio
- K. Rabies
- L. Syphilis
- M. Tetanus
- N. Toxoplasmosis
- O. Tuberculosis
- P. Viral hepatitis

- A. Cholera
- B. CMV (cytomegalovirus)
- C. Enteric fever
- D. Giardiasis
- E. Glandular fever
- F. Herpes zoster (shingles)
- G. HIV
- H. Influenza

- I. Malaria
- J. Polio
- K. Rabies
- L. Syphilis
- M. Tetanus
- N. Toxoplasmosis
- O. Tuberculosis
- P. Viral hepatitis

Choose the most likely infecting organism from the options above. Each option may be used only once.

Choose the most likely infecting organism from the options above. Each option may be used only once.

1. A 40 year old business man travels frequently to the Far East & Africa. He became generally unwell with a fever, generalized lymphatic swelling, & diarrhoea. On examination he was noted to have oral candidiasis. ☐
2. A 25 year old man developed a fever, malaise, lymphadenopathy & a rash on the palms of his soles of his feet. 6 weeks earlier he had a painless ulcer on his penis. ☐
3. A 30 year old man lacerated his leg in the garden, 2 months later he developed fever, & headache followed by a permanent grin-like posture, inability to close his mouth, arching of his body with hyperextension of his neck. ☐
4. A 20 year old lady developed fever, headache, cough & constipation, which turned to diarrhoea 10 days later. She also noticed a rash on her trunk. ☐
5. A 30 year old man who recently returned from a holiday in Bangladesh. He developed profuse watery diarrhoea, fever & vomiting. ☐

1. A 12 year old boy with flu like illness, followed by fever, headache, vomiting, & weakness of his left leg. ☐
2. A 20 year old man was bitten by a dog in street. 2 months later he developed a headache, fever & abnormal behaviour including the fear of water. ☐
3. A 40 year old lady developed tiredness, flatulence, abdominal bloating & loose stools. ☐

Answers: G L M C A

Answers: J K D

6. Antibiotics.

- A. Intravenous cefuroxime plus metronidazole
- B. Intravenous flucloxacillin plus benzylpenicillin
- C. Intravenous gentamicin
- D. Intravenous vancomycin
- E. Oral ciprofloxacin
- F. Oral flucloxacillin

- G. Oral gentamicin
- H. Oral nitrofurantoin
- I. Oral or intravenous chloramphenicol
- J. Oral rifampicin
- K. Oral tetracycline
- L. Oral trimethoprim

Choose the medication that is giving rise to each of the presentations below. **Each option may be used only once.**

1. 35-year-old man with a hot swollen left knee. Joint aspiration revealed pus. ☐
2. A 54-year-old patient on the ward. Blood culture proved methicillin-resistant *Staphylococcus aureus* (MRSA) infection. ☐
3. A 23-year-old pregnant woman presented with frequency and dysuria. Urine analysis revealed pus cells 30-50/HPF. ☐
4. A 45-year-old woman requires antibiotic prophylaxis for a cholecystectomy. ☐
5. A 25-year-old woman presents with sore throat and hoarseness of voice followed by pneumonia. Chlamydia serology is positive. ☐

Answers: B D H A K

1. 35 year-old man with a hot swollen left knee. Joint aspiration revealed pus.
Answer is B: This is a medical emergency and urgent Gram staining, and cultures are indicated. *Staphylococcus aureus* is the most common infecting pathogen in septic arthritis. Intravenous benzylpenicillin plus flucloxacillin is the preferred treatment until sensitivities are known. Remember the possibility of opportunistic infection if the patient is immunocompromised, e.g. HIV positive.

2. A 54-year-old patient on the ward. Blood culture proved methicillin-resistant *Staphylococcus aureus* (MRSA) infection.

Answer is D: Vancomycin is a glycopeptide antibiotic and is indicated for the treatment of MRSA infection. It should be given only intravenously for systemic infection because it is not significantly absorbed when given orally. Teicoplanin is a similar glycopeptide antibiotic with a longer duration of action (so it can be given once daily).

3. A 23-year-old pregnant woman presented with frequency and dysuria. Urine analysis revealed pus cells 30-50/HPF.

Answer is H: Trimethoprim should not be given in pregnancy because it is a folic acid antagonist and teratogenic. Quinolones and tetracycline should also be avoided. The adverse effects of nitrofurantoin include diarrhoea, vomiting, neuropathy and fibrosis. Nitrofurantoin should be avoided in pregnant mothers at term and in breast-feeding mothers.

4. A 45-year-old woman requires antibiotic prophylaxis for a cholecystectomy.

Answer is A: Intravenous co-Amoxi-Clav is an alternative prophylactic antibiotic regimen for abdominal surgery.

5. A 25-year-old woman presents with sore throat and hoarseness of voice followed by pneumonia. Chlamydia serology is positive.

Answer is K: Tetracycline is first-line treatment for chlamydia infection. Tetracycline is absolutely contraindicated in pregnancy and when breast-feeding. Tetracyclines are deposited in growing bone and can lead to permanent staining of teeth and dental hypoplasia. Patients treated with tetracycline are told to avoid milk products because these decrease absorption of the drug.

7. Antibiotics.

- A. Amoxicillin
- B. Ceftriaxone
- C. Cefuroxime & Erythromycin
- D. Ciprofloxacin
- E. Flucloxacillin
- F. Isoniazid

- G. Metronidazole
- H. Nitrofurantoin
- I. Rifampicin
- J. Teicoplanin
- K. Tetracycline
- L. Tetracycline & Chloramphenicol

Choose the medication that is giving rise to each of the presentations below. **Each option may be used only once.**

1. A 24-year-old woman complains of a yellow offensive vaginal discharge. Motile flagellate organisms are seen on wet film microscopy. ☐
2. A 29-year-old man requires treatment for a severe community acquired pneumonia. ☐
3. A 25-year-old camper presents with fever, dehydration and severe bloody diarrhoea. Stool culture reveals salmonella infection. ☐
4. An 18-year-old girl presents with fever, neck stiffness and photophobia. ☐
5. A 24-year-old man presents with widespread impetigo over the face. ☐

Answers: G C D B E

1. A 24-year-old woman complains of a yellow offensive vaginal discharge. Motile flagellate organisms are seen on wet film microscopy.

Answer is G: This is a typical presentation of an infection with *Trichomonas vaginalis*. This protozoan pathogen is sexually transmitted, causing a vaginitis in women and a non-gonococcal urethritis in men. Successful management involves treating both the patient and the partner.

2. A 29-year-old man requires treatment for a severe community acquired pneumonia.

Answer is C: An intravenous combination of a broad-spectrum β -lactamase antibiotic, e.g. co-Amoxi-Clav or a second-/third-generation cephalosporin, together with a macrolide, e.g. clarithromycin or erythromycin is the preferred empirical antibiotic choice for adults hospitalized with severe community acquired pneumonia.

3. A 25-year-old camper presents with fever, dehydration and severe bloody diarrhoea. Stool culture reveals salmonella infection.

Answer is D: Ciprofloxacin is indicated because this is a severe salmonella infection and the patient is systemically unwell.

4. An 18-year-old girl presents with fever, neck stiffness and photophobia.

Answer is B: Intravenous benzylpenicillin can be used for meningococcal (*Neisseria meningitidis*) infections.

5. A 24-year-old man presents with widespread impetigo over the face.

Answer is E: Impetigo is a highly infectious skin disease that is caused by *Staphylococcus aureus* infection in most cases. The typical lesion is a weeping, exudative area with a characteristic honey-colored crusting on the surface. Topical fusidic acid can be used for small areas, but flucloxacillin is indicated if there is widespread impetigo.

Short Heading Questions (SHQ)

- Which of the following is the commonest cause of traveler's diarrhea?
 - Escherichia coli*
 - Entamoeba histolytica*
 - Giardia lamblia*
 - Shigella flexneri*
 - Yersinia enterocolitica*
- Which of the following is correct regarding Herpes simplex encephalitis?
 - Shows a peak incidence in the Autumn
 - Is associated with a polymorphonuclear pleocytosis in the CSF
 - Produces a diffuse, evenly distributed inflammation of cerebral tissues
 - Produces a typical EEG pattern with lateralized periodic discharges at 2 Hz
 - Should be treated with acyclovir as soon as the diagnosis is confirmed by urgent CSF viral antibody titre
- Which of the following statements is characteristic of acute hepatitis B infection?
 - Most patients present with splenomegaly.
 - It confers immunity to hepatitis A.
 - It commonly presents with distal joint arthritis.
 - There is increased infectivity in the presence of the Hep B e antigen.
 - Pruritus is an important early symptom.
- Which of the following is true of Spontaneous bacterial peritonitis?
 - A survival rate of over 50% is expected at one year
 - Gentamicin is the treatment of choice
 - Is characteristically caused by aerobic gram negative bacteria.
 - Is diagnosed by culture of ascitic fluid.
 - Is due to intestinal perforation.
- Select one of the following answers relating to quinine therapy in *Plasmodium falciparum* Malaria:
 - quinine contraindicated in those taking mefloquine prophylactically
 - quinine must always be given parenterally initially
 - pregnancy is a contraindication for quinine
 - glucose level should be monitored in those on treatment with quinine
 - dose of quinine should be reduced in liver impairment
- A 17 year-old man presented with a strongly positive Mantoux test. Which one of the following statements regarding his immune reaction is correct?
 - It is a cell mediated immune response
 - The response is mediated by B lymphocytes
 - The area of induration will be less than 10 mm in diameter
 - The reaction typically develops within 24 hours
 - If a skin biopsy were taken, immunohistochemistry would show immune complex deposition

- What is the characteristic fundoscopic feature of infective endocarditis?
 - Cherry red macula
 - Janeway lesions
 - Macular star
 - Retinal artery aneurysms
 - Roth's spots
- Which of the following is a contraindication to immunization?
 - Infantile eczema requiring topical steroids.
 - Oral poliomyelitis vaccine to a child on oral steroids.
 - A history of prolonged jaundice.
 - A child with congenital adrenal hyperplasia on oral cortisone.
 - A child with cerebral palsy.
- Which of the following statement is true of infections with *Mycobacterium tuberculosis*?
 - Non-sputum producing patients are non-infectious
 - A positive tuberculin test indicates active disease
 - Lymph node positive disease requires longer treatment than pulmonary disease
 - In pregnant women treatment should not be given until after delivery
 - Pyrazinamide has high activity against active extracellular organisms
- In herpes simplex encephalitis which of the following statements is correct?
 - Brain MRI is characteristically normal
 - Temporal lobe involvement is common
 - Fits are uncommon
 - Cold sores or genital herpes are usually present
 - Viral identification by PCR on cerebrospinal fluid is non-specific
- Which of the following micro-organisms is generally sensitive to Benzylpenicillin?
 - Bordetella pertussis*
 - Cryptococcus neoformans*
 - Mycoplasma pneumoniae*
 - Legionella pneumophila*
 - Streptococcus Pneumoniae*
- Which of the following statements is correct of hepatitis C virus infection?
 - Cell cultures of virus are routinely used to assess response to drug therapy
 - High antibody titres are an indication for therapy
 - Less than 5% of cases lead to chronic infection
 - More likely to be transmitted by the sexual route than hepatitis B virus
 - Treatment with ribavirin and interferon alpha is more effective than interferon alpha alone
- Which of the following is true of *Giardia lamblia* infection?
 - Is often symptomatic
 - Is usually spread by contaminated meats
 - Is eradicated by mebendazole
 - Causes steatorrhea
 - Diagnosed by stool culture

Infections (SHQs)

14. Group A Strep is least likely to cause which of the following complications:

- A. Scarlet Fever
- B. Necrotizing Fasciitis
- C. Impetigo
- D. Subacute Bacterial Endocarditis
- E. Glomerulonephritis

15. Septra is used in AIDS patients to prevent which opportunistic organism?

- A. Pneumocystis carinii
- B. M. tuberculosis
- C. S. pneumoniae
- D. CMV
- E. Cryptococcus

16. Severe bloody, afebrile diarrhea is associated with what bacterial infection?

- A. Salmonella infection
- B. Enteroinvasive E. coli infection
- C. Enterohemorrhagic E. coli infection
- D. Enterotoxigenic E. coli infection
- E. Giardiasis

17. Human Herpes Virus 6 is associated with what disease?

- A. Infectious mononucleosis
- B. CMV infection
- C. Herpes Simplex infection
- D. Roseola
- E. Chicken Pox

18. Cat's scratch disease is caused by what organism?

- A. Leishmania spp.
- B. Bartonella henselae
- C. Treponema Pallidum
- D. Toxoplasma gondii
- E. Ancylostoma braziliense

19. Predictors of HIV progression include the following EXCEPT:

- A. CD4 cell count
- B. plasma HIV RNA levels at set point
- C. onset of HIV related symptoms
- D. age at initial infection
- E. method of transmission

20. Protozoa are associated with all of the following EXCEPT:

- A. Unicellular Organism
- B. Produce Larvae
- C. Do Not Cause Eosinophilia
- D. Indefinite Lifespan
- E. Multiply Within Host

Infections (SHQs)

21. In which disease would Donovan bodies be present?

- A. Genital Warts
- B. Lymphogranuloma Venereum
- C. Syphilis
- D. Granuloma Inguinale
- E. Chancroid

22. Which disease is NOT caused by Chlamydia sp.?

- A. Lymphogranuloma Venereum
- B. Pelvic Inflammatory Disease
- C. Granuloma Inguinale
- D. Inclusion Conjunctivitis
- E. Nongonococcal Urethritis

23. If a patient comes to your office complaining of chest pain and a cough producing current jelly-like sputum, which organism would be the most likely cause of his/her pneumonia?

- A. Streptococcus pneumoniae
- B. Haemophilus influenzae
- C. Pseudomonas aeruginosa
- D. Influenza virus
- E. Klebsiella pneumoniae

24. Which organ in the human body is the most sensitive to disseminated intravascular coagulation in a case of meningitis?

- A. Thyroid
- B. Adrenal
- C. Lateral Ventricle Of The Brain
- D. Spleen
- E. Aorta

25. The Negri body is a pathognomonic sign of:

- A. Acute Bacterial Meningitis
- B. Arbovirus Encephalitis
- C. Rabies
- D. Polio
- E. Chronic Meningitis

26. If untreated, this infection can lead to cholangiocarcinoma.

- A. Schistosomiasis
- B. Clonorchis sinensis
- C. Strongyloidosis
- D. Trypanosoma
- E. E. coli

Infections (SHQs)

Answer Key

1. A
2. E
3. D
4. C
5. D
6. A
7. E
8. B
9. A
10. B
11. E
12. E
13. D
14. D
15. A
16. C
17. D
18. B
19. E
20. B
21. D
22. C
23. E
24. B
25. C
26. B